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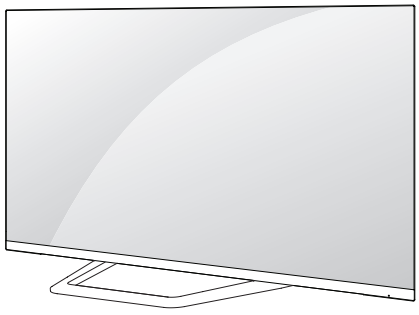
LED LCD TV
SERVICE MANUAL

CHASSIS : LB23E

MODEL : 55LM8600 55LM8600-TA
55LM860Y 55LM860Y-TA

CAUTION
BEFORE SERVICING THE CHASSIS,
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.



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CONTENTS

CONTENTS 2

SAFETY PRECAUTIONS 3

SERVICING PRECAUTIONS..... 4

SPECIFICATION 5

ADJUSTMENT INSTRUCTION 13

EXPLODED VIEW 20

SCHEMATIC CIRCUIT DIAGRAM .....

SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and Exploded View.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.

General Guidance

An **isolation Transformer should always be used** during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks.

It will also protect the receiver and it's components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it with the specified.

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1 W), keep the resistor 10 mm away from PCB.

Keep wires away from high voltage or high temperature parts.

Before returning the receiver to the customer,

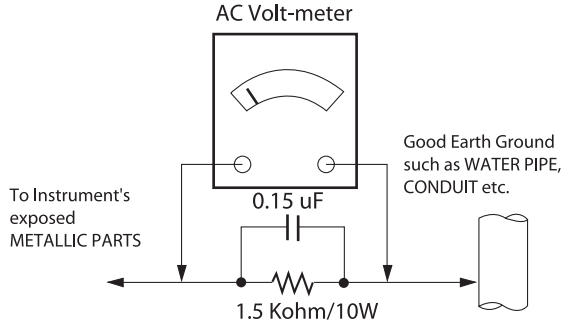
always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

Leakage Current Cold Check(Antenna Cold Check)
With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.
If the exposed metallic part has a return path to the chassis, the measured resistance should be between 1 MΩ and 5.2 MΩ.
When the exposed metal has no return path to the chassis the reading must be infinite.
An other abnormality exists that must be corrected before the receiver is returned to the customer.

Leakage Current Hot Check (See below Figure)
Plug the AC cord directly into the AC outlet.

Do not use a line Isolation Transformer during this check.
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.
Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.
Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which is corresponds to 0.5 mA.
In case any measurement is out of the limits specified, there is possibility of shock hazard and the set must be checked and repaired before it is returned to the customer.

Leakage Current Hot Check circuit



When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than 0.1 Ω
*Base on Adjustment standard

SERVICING PRECAUTIONS

CAUTION: Before servicing receivers covered by this service manual and its supplements and addenda, read and follow the *SAFETY PRECAUTIONS* on page 3 of this publication.
NOTE: If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions on page 3 of this publication, always follow the safety precautions. Remember: Safety First.

General Servicing Precautions

1. Always unplug the receiver AC power cord from the AC power source before;
   a. Removing or reinstalling any component, circuit board module or any other receiver assembly.
   b. Disconnecting or reconnecting any receiver electrical plug or other electrical connection.
   c. Connecting a test substitute in parallel with an electrolytic capacitor in the receiver.
   CAUTION: A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.
2. Test high voltage only by measuring it with an appropriate high voltage meter or other voltage measuring device (DVM, FETVOM, etc) equipped with a suitable high voltage probe. Do not test high voltage by "drawing an arc".
3. Do not spray chemicals on or near this receiver or any of its assemblies.
4. Unless specified otherwise in this service manual, clean electrical contacts only by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable non-abrasive applicator; 10 % (by volume) Acetone and 90 % (by volume) isopropyl alcohol (90 % - 99 % strength)
   CAUTION: This is a flammable mixture.
   Unless specified otherwise in this service manual, lubrication of contacts in not required.
5. Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.
6. Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
7. Always connect the test receiver ground lead to the receiver chassis ground before connecting the test receiver positive lead.
   Always remove the test receiver ground lead last.
8. Use with this receiver only the test fixtures specified in this service manual.
   CAUTION: Do not connect the test fixture ground strap to any heat sink in this receiver.

Electrostatically Sensitive (ES) Devices

Some semiconductor (solid-state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor “chip” components. The following techniques should be used to help reduce the incidence of component damage caused by static by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed to prevent potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static type solder removal device. Some solder removal devices not classified as “anti-static” can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
   CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

General Soldering Guidelines

1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range or 500 °F to 600 °F.
2. Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
3. Keep the soldering iron tip clean and well tinned.
4. Thoroughly clean the surfaces to be soldered. Use a mall wire-bristle (0.5 inch, or 1.25 cm) brush with a metal handle. Do not use freon-propelled spray-on cleaners.
5. Use the following unsoldering technique
   a. Allow the soldering iron tip to reach normal temperature. (500 °F to 600 °F)
   b. Heat the component lead until the solder melts.
   c. Quickly draw the melted solder with an anti-static, suction-type solder removal device or with solder braid.
   CAUTION: Work quickly to avoid overheating the circuit board printed foil.
6. Use the following soldering technique.
   a. Allow the soldering iron tip to reach a normal temperature (500 °F to 600 °F)
   b. First, hold the soldering iron tip and solder the strand against the component lead until the solder melts.
   c. Quickly move the soldering iron tip to the junction of the component lead and the printed circuit foil, and hold it there only until the solder flows onto and around both the component lead and the foil.
   CAUTION: Work quickly to avoid overheating the circuit board printed foil.
   d. Closely inspect the solder area and remove any excess or splashed solder with a small wire-bristle brush.

IC Remove/Replacement
Some chassis circuit boards have slotted holes (oblong) through which the IC leads are inserted and then bent flat against the circuit foil. When holes are the slotted type, the following technique should be used to remove and replace the IC. When working with boards using the familiar round hole, use the standard technique as outlined in paragraphs 5 and 6 above.

Removal
1. Desolder and straighten each IC lead in one operation by gently prying up on the lead with the soldering iron tip as the solder melts.
2. Draw away the melted solder with an anti-static suction-type solder removal device (or with solder braid) before removing the IC.

Replacement
1. Carefully insert the replacement IC in the circuit board.
2. Carefully bend each IC lead against the circuit foil pad and solder it.
3. Clean the soldered areas with a small wire-bristle brush. (It is not necessary to reapply acrylic coating to the areas).

"Small-Signal" Discrete Transistor Removal/Replacement
1. Remove the defective transistor by clipping its leads as close as possible to the component body.
2. Bend into a "U" shape the end of each of three leads remaining on the circuit board.
3. Bend into a "U" shape the replacement transistor leads.
4. Connect the replacement transistor leads to the corresponding leads extending from the circuit board and crimp the "U" with long nose pliers to insure metal to metal contact then solder each connection.

Power Output, Transistor Device
Removal/Replacement
1. Heat and remove all solder from around the transistor leads.
2. Remove the heat sink mounting screw (if so equipped).
3. Carefully remove the transistor from the heat sink of the circuit board.
4. Insert new transistor in the circuit board.
5. Solder each transistor lead, and clip off excess lead.
6. Replace heat sink.

Diode Removal/Replacement
1. Remove defective diode by clipping its leads as close as possible to diode body.
2. Bend the two remaining leads perpendicular y to the circuit board.
3. Observing diode polarity, wrap each lead of the new diode around the corresponding lead on the circuit board.
4. Securely crimp each connection and solder it.
5. Inspect (on the circuit board copper side) the solder joints of the two "original" leads. If they are not shiny, reheat them and if necessary, apply additional solder.

Fuse and Conventional Resistor
Removal/Replacement
1. Clip each fuse or resistor lead at top of the circuit board hollow stake.
2. Securely crimp the leads of replacement component around notch at stake top.
3. Solder the connections.
   CAUTION: Maintain original spacing between the replaced component and adjacent components and the circuit board to prevent excessive component temperatures.

Circuit Board Foil Repair
Excessive heat applied to the copper foil of any printed circuit board will weaken the adhesive that bonds the foil to the circuit board causing the foil to separate from or "lift-off" the board. The following guidelines and procedures should be followed whenever this condition is encountered.

At IC Connections
To repair a defective copper pattern at IC connections use the following procedure to install a jumper wire on the copper pattern side of the circuit board. (Use this technique only on IC connections).

1. Carefully remove the damaged copper pattern with a sharp knife. (Remove only as much copper as absolutely necessary).
2. carefully scratch away the solder resist and acrylic coating (if used) from the end of the remaining copper pattern.
3. Bend a small "U" in one end of a small gauge jumper wire and carefully crimp it around the IC pin. Solder the IC connection.
4. Route the jumper wire along the path of the out-away copper pattern and let it overlap the previously scraped end of the good copper pattern. Solder the overlapped area and clip off any excess jumper wire.

At Other Connections
Use the following technique to repair the defective copper pattern at connections other than IC Pins. This technique involves the installation of a jumper wire on the component side of the circuit board.

1. Remove the defective copper pattern with a sharp knife. Remove at least 1/4 inch of copper, to ensure that a hazardous condition will not exist if the jumper wire opens.
2. Trace along the copper pattern from both sides of the pattern break and locate the nearest component that is directly connected to the affected copper pattern.
3. Connect insulated 20-gauge jumper wire from the lead of the nearest component on one side of the pattern break to the lead of the nearest component on the other side.
   Carefully crimp and solder the connections.
   CAUTION: Be sure the insulated jumper wire is dressed so the it does not touch components or sharp edges.

SPECIFICATION

NOTE : Specifications and others are subject to change without notice for improvement.

1. Application range

This specification is applied to the LCD TV used LB23E chassis.

2. Requirement for Test

Each part is tested as below without special appointment.

1) Temperature: 25 °C ± 5 °C(77 °F ± 9 °F), CST: 40 °C ± 5 °C
2) Relative Humidity: 65 % ± 10 %
3) Power Voltage
   : Standard input voltage (AC 100-240 V~, 50/60 Hz)
   * Standard Voltage of each products is marked by models.
4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM.
5) The receiver must be operated for about 5 minutes prior to the adjustment.

3. Test method

1) Performance: LGE TV test method followed
2) Demanded other specification
   - Safety : CE, IEC specification
   - EMC : CE, IEC

4. Model General Specification

No.	Item	Specification	Remarks
1	Market	Asia, Oceania, Africa, Middle East(PAL/DVB Market)	DTV & Analog * DTV Region: Australia/ NewZealand(AU), Singapore(SG), Indonesia(ID), Malaysia(MY), Vietnam(VN), South Africa(ZA), Iran(IR), Israel(IL)
2	Broadcasting system	Digital : DVB-T Analog : PAL-BG, DK, I/I', SECAM-DK/BG/I	▪ Australia/India : only PAL
3	Receiving system	Digital : COFDM, QAM Analog : Upper Heterodyne	▪ DVB-T - Guard Interval(Bitrate_Mbit/s) 1/4, 1/8, 1/16, 1/32 - Modulation : Code Rate QPSK : 1/2, 2/3, 3/4, 5/6, 7/8 16-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 64-QAM : 1/2, 2/3, 3/4, 5/6, 7/8
5	Video Input RCA(2EA)	PAL, SECAM, NTSC	4 System : PAL, SECAM, NTSC, PAL60 Rear 1EA, AV gender jack 1EA
6	Component Input (2EA)	Y/Cb/Cr, Y/Pb/Pr	Rear gender (1EA)
7	RGB Input (1EA)	RGB-PC	Analog(D-SUB 15PIN) Rear gender(1EA)
8	HDMI Input (4EA)	PC(HDMI version 1.3) / DTV format, Support HDCP HDMI1-ARC, HDMI2, HDMI3, HDMI4-MHL	Side
9	Audio Input (3EA)	RGB/DVI Audio Component, AV	L/R Input ; Rear (Phone) Component and av use same jack ; Rear (Gender)
10	SPDIF out(1EA)	Optical Audio out	Rear (1EA)
11	USB Input(3EA)	EMF, DivX HD, For SVC (download)	Side JPEG, MP3, DivX HD

5. Component Video Input (Y, CB/PB, CR/PR)

No.	Resolution	H-freq(kHz)	V-freq(Hz)	Pixel clock(MHz)	Proposed
1.	720*480i	15.73	59.94	13.500	SDTV, DVD 480I(525I)
2	720*480i	15.73	60.00	13.514	SDTV, DVD 480I(525I)
3.	720*576i	15.625	50.00	13.500	SDTV, DVD 576I(625I) 50Hz
4	720*480p	31.47	59.94	27.000	SDTV 480P
5	720*480p	31.50	60.00	27.027	SDTV 480P
6	720*576p	31.25	50.00	27.000	SDTV 576P 50Hz
7	1280*720	44.96	59.94	74.176	HDTV 720P
8	1280*720	45.00	60.00	74.250	HDTV 720P
9	1280*720	37.50	50.00	74.25	HDTV 720P 50Hz
10	1920*1080	28.125	50.00	74.250	HDTV 1080I 50Hz
11	1920*1080	33.72	59.94	74.176	HDTV 1080I
12	1920*1080	33.75	60.00	74.25	HDTV 1080I
13	1920*1080	26.97	23.976	63.296	HDTV 1080P
14	1920*1080	27.00	24.000	63.36	HDTV 1080P
15	1920*1080	33.71	29.97	79.120	HDTV 1080P
16	1920*1080	33.75	30.00	79.20	HDTV 1080P
17	1920*1080	56.25	50	148.5	HDTV 1080P
18	1920*1080	67.432	59.94	148.350	HDTV 1080P
19	1920*1080	67.5	60.00	148.5	HDTV 1080P

6. RGB (PC)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	Remarks
1.	640*350	31.468	70.09	25.17	EGA	
2	720*400	31.469	70.09	28.32	DOS	
3.	640*480	31.469	59.94	25.17	VESA(VGA)	
4	800*600	37.879	60.317	40	VESA(SVGA)	
5	1024*768	48.363	60.004	65	VESA(XGA)	
6	1152*864	54.348	60.053	80	VESA	
7	1360*768	47.712	60.015	84.5	VESA(WXGA)	
8	1920*1080	66.5	60.00	148.5	WUXGA(CEA 861D)	Only FHD Model

7. HDMI Input

7.1. DTV Mode

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed	Remarks
1	720*480	15.73	59.94	13.500	SDTV, DVD 480I(525I)	Spec. out but display.
2	720*480	15.75	60.00	13.514	SDTV, DVD 480I(525I)	
3	720*576	15.625	50.00	13.500	SDTV, DVD 576I(625I) 50Hz	
4	720*480	31.47	59.94	27	SDTV 480P	
5	720*480	31.5	60.00	27.027	SDTV 480P	
6	720*576	31.25	50.00	27	SDTV 576P	
7	1280*720	44.96	59.94	74.176	HDTV 720P	
8	1280*720	45	60.00	74.25	HDTV 720P	
9	1280*720	37.5	50.00	74.25	HDTV 720P	
10	1920*1080	28.125	50.00	74.25	HDTV 1080I	
11	1920*1080	33.72	59.94	74.176	HDTV 1080I	
12	1920*1080	33.75	60.00	74.25	HDTV 1080I	
13	1920*1080	26.97	23.976	63.296	HDTV 1080P	
14	1920*1080	27.00	24.000	63.36	HDTV 1080P	
15	1920*1080	33.71	29.97	79.120	HDTV 1080P	
16	1920*1080	33.75	30.00	79.20	HDTV 1080P	
17	1920*1080	56.25	50.00	148.5	HDTV 1080P	
18	1920*1080	67.432	59.94	148.350	HDTV 1080P	
19	1920*1080	67.5	60.00	148.5	HDTV 1080P	

7.2. PC Mode

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	Remarks
1	720*400	31.469	70.09	28.32	DOS	
2	640*480	31.469	59.94	25.17	VESA(VGA)	
3	800*600	37.879	60.317	40	VESA(SVGA)	
4	1024*768	48.363	60.004	65	VESA(XGA)	
5	1360*768	47.712	60.015	84.75	VESA(WXGA)	
6	1152*864	54.348	60.053	80	VESA	
7	1280*1024	63.981	60.02	109.00	SXGA	Only FHD Model (Support to HDMI-PC)
8	1920*1080	67.5	60	158.40	WUXGA(Reduced Blanking)	Only FHD Model

8. RF Input_3D Mode

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	Remarks
1	1280*720	37.500	50	74.25	HDTV 720P	Side by Side, Top & Bottom
2	1920*1080	28.125	50	74.25	HDTV 1080I	Side by Side, Top & Bottom

9. HDMI Input

9.1. HDMI 1.3 (3D Supported mode manually)

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed	3D input proposed mode
1	1280*720	45.00	60.00	74.25	HDTV 720P	2D to 3D, Side by Side(half), Top & Bottom, Single Frame Sequential
2	1280*720	37.500	50	74.25	HDTV 720P	2D to 3D, Side by Side(half), Top & Bottom, Single Frame Sequential
3	1920*1080	33.75	60.00	74.25	HDTV 1080I	2D to 3D, Side by Side(half), Top & Bottom
4	1920*1080	28.125	50.00	74.25	HDTV 1080I	2D to 3D, Side by Side(half), Top & Bottom
5	1920*1080	27.00	24.00	74.25	HDTV 1080P	2D to 3D, Side by Side(half), Top & Bottom, Checkerboard
6	1920*1080	28.12	25.00	74.25	HDTV 1080P	2D to 3D, Side by Side(half), Top & Bottom, Checkerboard
7	1920*1080	33.75	30.00	74.25	HDTV 1080P	2D to 3D, Side by Side(half), Top & Bottom, Checkerboard
8	1920*1080	67.50	60.00	148.5	HDTV 1080P	2D to 3D, Side by Side(half), Top & Bottom, Checkerboard, Single Frame Sequential, Row Interleaving, Column Interleaving
9	1920*1080	56.250	50.00	148.5	HDTV 1080P	2D to 3D, Side by Side(half), Top & Bottom, Checkerboard, Single Frame Sequential, Row Interleaving, Column Interleaving

9.2. HDMI 1.4b (3D Supported mode automatically)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	VIC	3D input proposed mode	Proposed
1	640*480	31.469 / 31.5	59.94 / 60	25.125	1	Frame packing, Line alternative Side-by-side(Full) Top-and-Bottom Side-by-side(half)	Secondary(SDTV 480P) (SDTV 480P) (SDTV 480P) Secondary(SDTV 480P) Secondary(SDTV 480P)
2	720*480	31.469 / 31.5	59.94 / 60	27.00 / 27.03	2,3	Frame packing, Line alternative Side-by-side(Full) Top-and-Bottom Side-by-side(half)	Secondary(SDTV 480P) (SDTV 480P) (SDTV 480P) Secondary(SDTV 480P) Secondary(SDTV 480P)
3	720*576	31.25	50	27	17,18	Frame packing, Line alternative Side-by-side(Full) Top-and-Bottom Side-by-side(half)	Secondary(SDTV 480P) (SDTV 480P) (SDTV 480P) Secondary(SDTV 480P) Secondary(SDTV 480P)
4	720*576	15.625	50	27	21	Frame packing Field alternative Side-by-side(Full) Top-and-Bottom Side-by-side(half)	Secondary(SDTV 576I) (SDTV 576I (SDTV 576I Secondary(SDTV 576I) Secondary(SDTV 576I)
5	1280*720	37.500	50	74.25	19	Top-and-Bottom Side-by-side(half)	Primary(HDTV 720P) Primary(HDTV 720P)
6	1280*720	75	50	148.5	19	Frame packing Line alternative Side-by-side(Full)	Primary(HDTV 720P) (HDTV 720P) (HDTV 720P)
7	1280*720	44.96 / 45	59.94 / 60	74.17/74.25	4	Top-and-Bottom Side-by-side(half)	Primary(HDTV 720P) Primary(HDTV 720P)
8	1280*720	90	59.94 / 60	148.5	4	Frame packing Line alternative Side-by-side(Full)	Primary(HDTV 720P) (HDTV 720P) (HDTV 720P)
9	1920*1080	33.72 / 33.75	59.94 / 60	74.17/74.25	5	Top-and-Bottom Side-by-side(half)	Secondary(HDTV 1080I) Primary(HDTV 1080I)
10	1920*1080	67.50	59.94 / 60	148.5	5	Frame packing Field alternative Side-by-side(Full)	Primary(HDTV 1080I) (HDTV 1080I) (HDTV 1080I)
11	1920*1080	28.125	50.00	74.25	20	Top-and-Bottom Side-by-side(half)	Secondary(HDTV 1080I) Primary(HDTV 1080I)
12	1920*1080	56.25	50.00	148.5	20	Frame packing Field alternative Side-by-side(Full)	Primary(HDTV 1080I) (HDTV 1080I) (HDTV 1080I)
13	1920*1080	26.97 / 27	23.97 / 24	74.17/74.25	32	Top-and-Bottom Side-by-side(half)	Primary(HDTV 1080P) Primary(HDTV 1080P)
14	1920*1080	26.97 / 27	23.97 / 24	148.5	32	Frame packing Line alternative	Primary(HDTV 1080P) (HDTV 1080P) (HDTV 1080P)
15	1920*1080	28.12	25	74.17/74.25	33	Top-and-Bottom Side-by-side(half)	Secondary(HDTV 1080P) Secondary(HDTV 1080P)
16	1920*1080	28.12	25	148.5	33	Frame packing Line alternative Side-by-side(Full)	Secondary(HDTV 1080P) (HDTV 1080P) (HDTV 1080P)
17	1920*1080	33.716 / 33.75	29.976 / 30.00	74.25	34	Top-and-Bottom Side-by-side(half)	(HDTV 1080P) Secondary(HDTV 1080P)
18	1920*1080	33.716 / 33.75	29.976 / 30.00	148.5	34	Frame packing Line alternative Side-by-side(Full)	(HDTV 1080P) (HDTV 1080P) (HDTV 1080P)
19	1920*1080	56.250	50	148.5	31	Top-and-Bottom Side-by-side(half)	Primary(HDTV 1080P) Secondary(HDTV 1080P)
20	1920*1080	67.43 / 67.5	59.94 / 60	148.35/148.50	16	Top-and-Bottom Side-by-side(half)	Primary(HDTV 1080P) Secondary(HDTV 1080P)

9.3. HDMI-PC Input (3D) (3D Supported mode manually)

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	3D input proposed mode	Proposed
1	1024*768	48.36	60	65	2D to 3D, Side by Side(half) Top & Bottom	HDTV 768P
2	1360*768	47.71	60	85.5	2D to 3D, Side by Side(half) Top & Bottom	HDTV 768P
3	1920*1080	67.500	60	148.50	2D to 3D, Side by Side(half) Top & Bottom, Checker Board, Single Frame Sequential	HDTV 1080P
4	Others	-	-	-	2D to 3D	640*350 720*400 640*480 800*600 1152*864

9.4. RGB-PC Input(3D) (3D Supported mode manually)

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	3D input proposed mode	Proposed
1	1024*768	48.36	60	65	2D to 3D, Side by Side(half) Top & Bottom	HDTV 768P
2	1360*768	47.71	60	85.5	2D to 3D, Side by Side(half) Top & Bottom	HDTV 768P
3	1920*1080	67.500	60	148.50	2D to 3D, Side by Side(half) Top & Bottom	HDTV 1080P
4	Others	-	-	-	2D to 3D	640*350 720*400 640*480 800*600 1152*864 1280*1024

9.5. Component Input (3D) (3D Supported mode manually)

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	3D input proposed mode	Proposed
1	1280*720	37.5	50	74.25	2D to 3D, Side by Side(half), Top & Bottom	HDTV 720P
2	1280*720	45.00	60.00	74.25	2D to 3D, Side by Side(half), Top & Bottom	HDTV 720P
3	1280*720	44.96	59.94	74.176	2D to 3D, Side by Side(half), Top & Bottom	HDTV 720P
4	1920*1080	33.75	60.00	74.25	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080I
5	1920*1080	33.72	59.94	74.176	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080I
6	1920*1080	28.12	50	74.25	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080I
7	1920*1080	67.500	60	148.50	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080P
8	1920*1080	67.432	59.94	148.352	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080P
9	1920*1080	27.000	24.000	74.25	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080P
10	1920*1080	28.12	25	74.25	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080P
11	1920*1080	56.25	50	74.25	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080P
12	1920*1080	26.97	23.976	74.176	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080P
13	1920*1080	33.75	30.000	74.25	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080P
14	1920*1080	33.71	29.97	74.176	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080P

9.6. USB Input (3D) (3D Supported mode manually)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	3D input proposed mode	Proposed
1	1920*1080	33.75	30	74.25	2D to 3D Side by Side(Half)*, Top & Bottom*, Checkerboard* Row Interleaving, Column Interleaving (Photo : side by Side(half), Top & Bottom)	HDTV 1080P

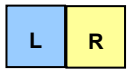
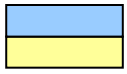
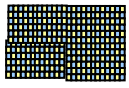
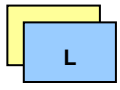
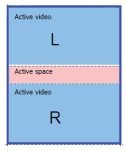
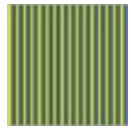
("*" 3D supported mode manually & automatically)

9.7. DLNA Input (3D) (3D Supported mode manually)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	3D input proposed mode	Proposed
1	1920*1080	33.75	30	74.25	2D to 3D Side by Side(Half)*, Top & Bottom*, Checkerboard* Row Interleaving, Column Interleaving (Photo : side by Side(half), Top & Bottom)	HDTV 1080P

("*" 3D supported mode manually & automatically)

■ Remark: 3D Input mode

No.	Side by Side	Top & Bottom	Checker board	Single Frame Sequential	Frame Packing	Line Interleaving	Column Interleaving
1							

ADJUSTMENT INSTRUCTION

1. Application Range

This specification sheet is applied to all of the LED LCD TV with LB23E chassis.

2. Designation

(1) Because this is not a hot chassis, it is not necessary to use an isolation transformer. However, the use of isolation transformer will help protect test instrument.
(2) Adjustment must be done in the correct order.
(3) The adjustment must be performed in the circumstance of 25 °C ± 5 °C of temperature and 65 % ± 10 % of relative humidity if there is no specific designation.
(4) The input voltage of the receiver must keep AC 100-240 V~, 50/60 Hz.
(5) The receiver must be operated for about 5 minutes prior to the adjustment when module is in the circumstance of over 15.

In case of keeping module is in the circumstance of 0 °C, it should be placed in the circumstance of above 15 °C for 2 hours.

In case of keeping module is in the circumstance of below -20 °C, it should be placed in the circumstance of above 15 °C for 3 hours.

[Caution]
When still image is displayed for a period of 20 minutes or longer (Especially where W/B scale is strong. Digital pattern 13ch and/or Cross hatch pattern 09ch), there can some afterimage in the black level area.

3. Automatic Adjustment

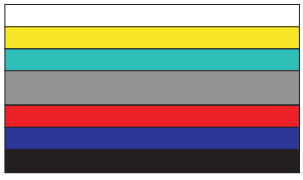
3.1. ADC Adjustment

3.1.1. Overview

ADC adjustment is needed to find the optimum black level and gain in Analog-to-Digital device and to compensate RGB deviation.

3.1.2. Equipment & Condition

(1) USB to RS-232C Jig
(2) MSPG-925 Series Pattern Generator(MSPG-925FA, pattern - 65)
- Resolution : 480i Comp1
  1080P Comp1
  1920*1080 RGB
- Pattern : Horizontal 100% Color Bar Pattern
- Pattern level : 0.7 ± 0.1 Vp-p
- Image



3.1.3. Adjustment

(1) Adjustment method
- Using RS-232, adjust items in the other shown in "3.1.3.3)"

(2) Adj. protocol

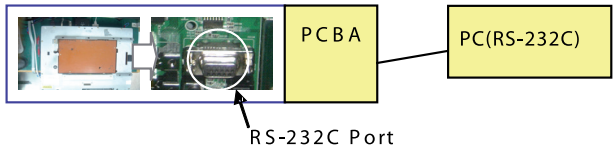
Protocol	Command	Set ACK
Enter adj. mode	aa 00 00	a 00 OK00x
Source change	xb 00 04	b 00 OK04x (Adjust 480i, 1080p Comp1)
	xb 00 06	b 00 OK06x (Adjust 1920*1080 RGB)
Begin adj.	ad 00 10	
Return adj. result		OKx (Case of Success) NGx (Case of Fail)
Read adj. data	(main) ad 00 20	(main) 00000000000000000000000007c007b006dx
	(sub) ad 00 21	(Sub) 00000007000000000000000007c00830077x
Confirm adj.	ad 00 99	NG 03 00x (Fail) NG 03 01x (Fail) NG 03 02x (Fail) OK 03 03x (Success)
End adj.	aa 00 90	a 00 OK90x

Ref.) ADC Adj. RS232C Protocol_Ver1.0

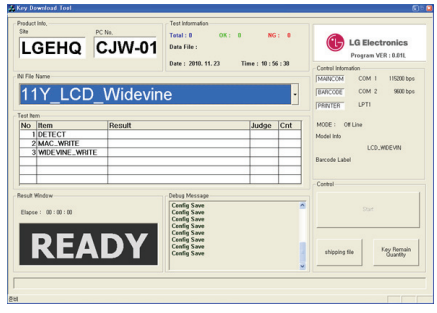
(3) Adj. order
- aa 00 00 [Enter ADC adj. mode]
- xb 00 04 [Change input source to Component1 (480i& 1080p)]
- ad 00 10 [Adjust 480i&1080p Comp1]
- xb 00 06 [Change input source to RGB(1024*768)]
- ad 00 10 [Adjust 1920*1080 RGB]
- ad 00 90 End adj.

3.2. MAC address D/L , Widevine key D/L

Connect: PCBA Jig → RS-232C Port== PC → RS-232C Port
Communication Prot connection



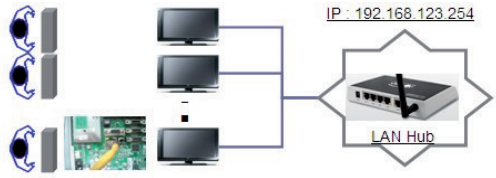
- Com 1,2,3,4 and 115200(Baudrate)
  Mode check: Online Only
- Check the test process: DETECT → MAC → Widevine
- Play: START
- Result: Ready, Test, OK or NG
- Printer Out (MAC Address Label)



3.3. LAN

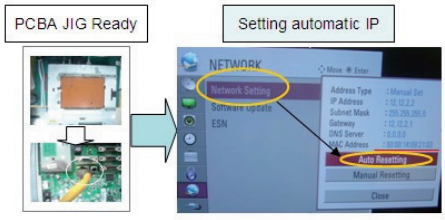
3.3.1. Equipment & Condition

▪ Each other connection to LAN Port of IP Hub and Jig



3.3.2. LAN inspection solution

▪ LAN Port connection with PCB
▪ Network setting at MENU Mode of TV
▪ Setting automatic IP
▪ Setting state confirmation
-> If automatic setting is finished, you confirm IP and MAC Address.

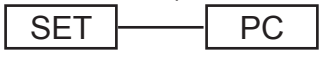


3.3.3. WIDEVINE key Inspection

- Confirm key input data at the "IN START" MENU Mode.

3.4. LAN PORT INSPECTION(PING TEST)

Connect SET -> LAN port == PC -> LAN Port

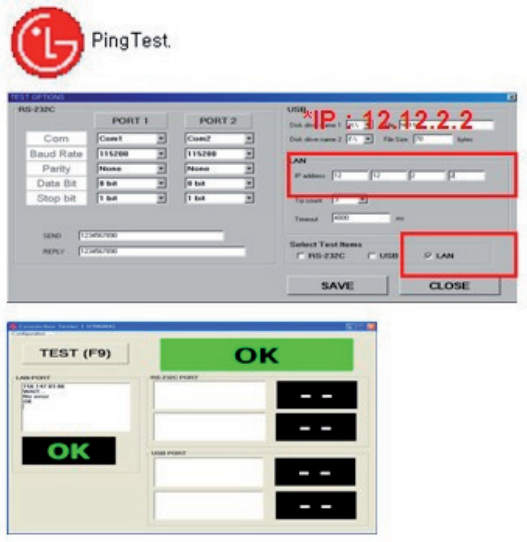


3.4.1. Equipment setting

(1) Play the LAN Port Test PROGRAM.
(2) Input IP set up for an inspection to Test Program.
*IP Number : 12.12.2.2

3.4.2. LAN PORT inspection (PING TEST)

(1) Play the LAN Port Test Program.
(2) Connect each other LAN Port Jack.
(3) Play Test (F9) button and confirm OK Message.
(4) Remove LAN cable.



3.5. Model name & Serial number Download

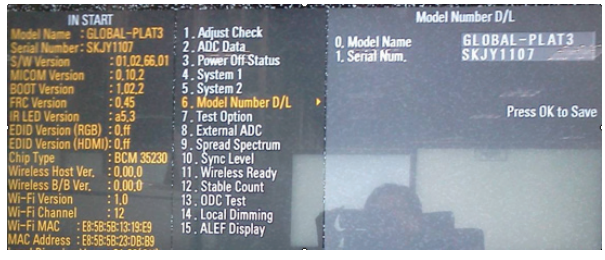
3.5.1. Model name & Serial number D/L

- Press "Power on" key of service remote control. (Baud rate : 115200 bps)
- Connect RS232 Signal to USB Cable to USB.
- Write Serial number by use USB port.
- Must check the serial number at Instart menu.

3.5.2. Method & notice

(1) Serial number D/L is using of scan equipment.
(2) Setting of scan equipment operated by Manufacturing Technology Group.
(3) Serial number D/L must be conformed when it is produced in production line, because serial number D/L is mandatory by D-book 4.0

* Manual Download (Model Name and Serial Number)
If the TV set is downloaded by OTA or service man, sometimes model name or serial number is initialized.(Not always)
It is impossible to download by bar code scan, so It need Manual download.
1) Press the "Instart" key of Adjustment remote control.
2) Go to the menu "6.Model Number D/L" like below photo.
3) Input the Factory model name(ex 55LM8600-TA) or Serial number like photo.



4) Check the model name Instart menu. -> Factory name displayed. (ex 55LM8600-TA)
5) Check the Diagnostics.(DTV country only) -> Buyer model displayed. (ex 55LM8600-TA)

3.6. WIFI MAC ADDRESS CHECK

(1) Using RS232

	H-freq(kHz)	V-freq.(Hz)
Transmission	[A][I][][Set ID][][20][Cr]	[O][K][X] or [NG]

(2) Check the menu on in-start.

4. Manual Adjustment

** ADC adjustment is not needed because of OTP(Auto ADC adjustment)*

4.1. EDID(The Extended Display Identification Data)/DDC(Display Data Channel) download

4.1.1. Overview

It is a VESA regulation. A PC or a MNT will display an optimal resolution through information sharing without any necessity of user input. It is a realization of "Plug and Play".

4.1.2. Equipment

- Since embedded EDID data is used, EDID download JIG, HDMI cable and D-sub cable are not need.
- Adjustment remote control

4.1.3. Download method

(1) Press "ADJ" key on the Adjustment remote control then select "12.EDID D/L", By pressing "Enter" key, enter EDID D/L menu.

(2) Select "Start" button by pressing "Enter" key, HDMI1/ HDMI2/ HDMI3/ HDMI4/ RGB are writing and display OK or NG.

For Analog	For HDMI EDID
D-sub to D-sub	DVI-D to HDMI or HDMI to HDMI
	 

4.2.4. EDID DATA

▪ HDMI(FHD 3D, HDMI 1.4a, 3D)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	16	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
30	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	A0	5A	00	00	00	1E	66	21	50	B0	51	00	1B	30
50	40	70	36	00	A0	5A	00	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	43
80	02	03	37	F1	4E	10	9F	04	13	05	14	03	02	12	20	21
90	22	15	01	26	15	07	50	09	57	07	78	03	0C	00	XX	XX
A0	B8	2D	20	C0	0E	01	4F	3F	FC	08	10	18	10	06	10	16
B0	10	28	10	03	05	03	01	02	3A	80	18	71	38	2D	40	58
C0	2C	45	00	A0	5A	00	00	00	1E	01	1D	80	18	71	1C	16
D0	20	58	2C	25	00	A0	5A	00	00	00	9E	01	1D	00	72	51
E0	D0	1E	20	6E	28	55	00	A0	5A	00	00	00	1E	00	00	00
F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	XX

▪ RGB

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	16	01	03	80	00	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
30	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	A0	5A	00	00	00	1E	66	21	50	B0	51	00	1B	30
50	40	70	36	00	A0	5A	00	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	00	5C

▪ Reference
- HDMI1 ~ HDMI4
- In the data of EDID, bellows may be different by Input mode.

* Physical Add & Checksum(HDMI1/2/3/4)

INPUT	9Eh/9Fh (Physical Addr)		FFh (Checksum)
HDMI1	10	00	11
HDMI2	20	00	01
HDMI3	30	00	F1
HDMI4	40	00	E1

4.3. White Balance Adjustment

4.3.1. Overview

▪ W/B adj. Objective & How-it-works

(1) Objective: To reduce each Panel's W/B deviation

(2) How-it-works : When R/G/B gain in the OSD is at 192, it means the panel is at its Full Dynamic Range. In order to prevent saturation of Full Dynamic range and data, one of R/G/B is fixed at 192, and the other two is lowered to find the desired value.

(3) Adjustment condition : normal temperature

1) Surrounding Temperature : 25 °C ± 5 °C

2) Warm-up time: About 5 Min

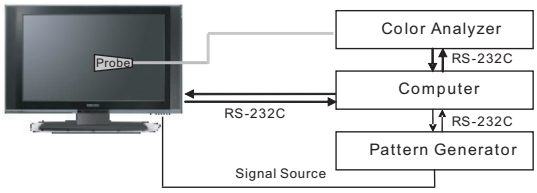
3) Surrounding Humidity : 20 % ~ 80 %

4.3.2. Equipment

(1) Color Analyzer: CA-210 (LED Module : CH 14)
(2) Adjustment Computer(During auto adj., RS-232C protocol is needed)
(3) Adjustment Remote control
(4) Video Signal Generator MSPG-925F 720p/216-Gray (Model: 217, Pattern: 78)
-> Only when internal pattern is not available

• Color Analyzer Matrix should be calibrated using CS-1000.

4.3.3. Equipment connection MAP



* If TV internal pattern is used, not needed

4.3.4. Adj. Command (Protocol)

<Command Format>

START	6E	A	50	A	LEN	A	03	A	CMD	A	00	A	VAL	A	CS	STOP

- LEN: Number of Data Byte to be sent
- CMD: Command
- VAL: FOS Data value
- CS: Checksum of sent data
- A: Acknowledge

Ex) [Send: JA_00_DD] / [Ack: A_00_okDDX]

▪ RS-232C Command used during auto-adjustment.

RS-232C COMMAND [CMD	ID	DATA]	Explantion
wb	00	00	Begin White Balance adjustment
wb	00	10	Gain adjustment(internal white pattern)
wb	00	1f	Gain adjustment completed
wb	00	20	Offset adjustment(internal white pattern)
wb	00	2f	Offset adjustment completed
wb	00	ff	End White Balance adjustment (internal pattern disappears)

Ex) wb 00 00 -> Begin white balance auto-adj.
wb 00 10 -> Gain adj.
ja 00 ff -> Adj. data
jb 00 c0
...
...
wb 00 1f -> Gain adj. completed
*(wb 00 20(Start), wb 00 2f(end)) -> Off-set adj.
wb 00 ff -> End white balance auto-adj.

▪ Adj. Map

	Adj. item	Command (lower case ASCII)		Data Range (Hex.)		Default (Decimal)
		CMD1	CMD2	MIN	MAX	
Cool	R Gain	j	g	00	C0	
	G Gain	j	h	00	C0	
	B Gain	j	i	00	C0	
	R Cut					
	G Cut					
	B Cut					
Medium	R Gain	j	a	00	C0	
	G Gain	j	b	00	C0	
	B Gain	j	c	00	C0	
	R Cut					
	G Cut					
	B Cut					
Warm	R Gain	j	d	00	C0	
	G Gain	j	e	00	C0	
	B Gain	j	f	00	C0	
	R Cut					
	G Cut					

4.3.5. Adj. method

(1) Auto adj. method
1) Set TV in adj. mode using POWER ON key.
2) Zero calibrate probe then place it on the center of the Display.
3) Connect Cable.(RS-232C to USB)
4) Select mode in adj. Program and begin adj.
5) When adj. is complete (OK Sign), check adj. status pre mode. (Warm, Medium, Cool)
6) Remove probe and RS-232C cable to complete adj.

▪ W/B Adj. must begin as start command “wb 00 00” , and finish as end command “wb 00 ff”, and Adj. offset if need.

(2) Manual adjustment. method
1) Set TV in Adj. mode using POWER ON.
2) Zero Calibrate the probe of Color Analyzer, then place it on the center of LCD module within 10 cm of the surface.
3) Press ADJ key → EZ adjust using adj. R/C → 7. White-Balance then press the cursor to the right(key ►). (When right key(►) is pressed 216 Gray internal pattern will be displayed)
4) One of R Gain / G Gain / B Gain should be fixed at 192, and the rest will be lowered to meet the desired value.
5) Adjustment is performed in COOL, MEDIUM, WARM 3 modes of color temperature.

▪ If internal pattern is not available, use RF input. In EZ Adj. menu 7.White Balance, you can select one of 2 Test-pattern: ON, OFF. Default is inner(ON). By selecting OFF, you can adjust using RF signal in 216 Gray pattern.

▪ Adjustment condition and cautionary items

1) Lighting condition in surrounding area
Surrounding lighting should be lower 10 lux. Try to isolate adj. area into dark surrounding.

2) Probe location
: Color Analyzer(CA-210) probe should be within 10 cm and perpendicular of the module surface (80° ~ 100°)

3) Aging time
- After Aging Start, Keep the Power ON status during 5 Minutes.
- In case of LCD, Back-light on should be checked using no signal or Full-white pattern.

4.3.6. Reference(White balance adjusmtment coordinate and color temperature)

▪ Luminance : 216 Gray

▪ Standard color coordinate and temperature using CS-1000 (over 26 inch)

Mode	Coordinate		Temp	Δuv
	x	y		
Cool	0.269	0.273	13000 K	0.0000
Medium	0.285	0.293	9300 K	0.0000
Warm	0.313	0.329	6500 K	0.0000

▪ Standard color coordinate and temperature using CA-210(CH 14)

Mode	Coordinate		Temp	Δuv
	x	y		
Cool	0.269 ± 0.002	0.273 ± 0.002	13000 K	0.0000
Medium	0.285 ± 0.002	0.293 ± 0.002	9300 K	0.0000
Warm	0.313 ± 0.002	0.329 ± 0.002	6500 K	0.0000

4.3.7. ALELF & EDGE & IOL LED White balance table

- EDGE LED module change color coordinate because of aging time.
- Apply under the color coordinate table, for compensated aging time.
- EDGE LED(LM8600-TA) - LGD Only

GP3	Aging time (Min)	Cool		Medium		Warm	
		X	y	x	y	x	y
		269	273	285	293	313	329
1	0-2	279	288	295	308	319	338
2	3-5	278	286	294	306	318	336
3	6-9	277	285	293	305	317	335
4	10-19	276	283	292	303	316	333
5	20-35	274	280	290	300	314	330
6	36-49	272	277	288	297	312	327
7	50-79	271	275	287	295	311	325
8	80-149	270	274	286	294	310	324
9	Over 150	269	273	285	293	309	323

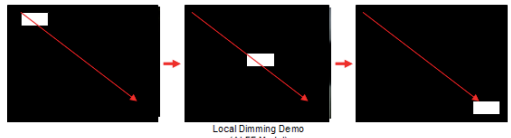
4.4. EYE-Q function check

(1) Turn on TV.
(2) Press EYE key of Adjustment remote control.
(3) Cover the Eye Q II sensor on the front of the using your hand and wait for 6 seconds.
(4) Confirm that R/G/B value is lower than 10 of the "Raw Data (Sensor data, Back light)". If after 6 seconds, R/G/B value is not lower than 10, replace Eye Q II sensor.
(5) Remove your hand from the Eye Q II sensor and wait for 6 seconds.
(6) Confirm that "ok" pop up. If change is not seen, replace Eye Q II sensor.

4.5. Local Dimming Function Check

Step 1) Turn on TV.
Step 2) At the Local Dimming mode, module Edge Backlight moving right to left Back light of IOP module moving.
Step 3) Confirm the Local Dimming mode.
Step 4) Press "exit" key.


Local Dimming Demo
(Edge LED Model)


Local Dimming Demo
(ALEF Model)

4.6. Magic Motion Remote control test

- Equipment : RF Remote control for test, IR-KEY-Code Remote control for test
- You must confirm the battery power of RF-Remote control before test(recommend that change the battery per every lot)
- Sequence (test)
  1) If you select the "Start(Mute)" key on the Adjustment remote control, you can pairing with the TV SET.
  2) You can check the cursor on the TV Screen, when select the "OK" key on the Adjustment remote control.
  3) You must remove the pairing with the TV Set by select "OK" key + "Mute" key on the Adjustment remote control for 5 seconds.

4.7. 3D function test

(Pattern Generator MSHG-600, MSPG-6100[Support HDMI1.4])
* HDMI mode NO. 872 , pattern No.83

1) Please input 3D test pattern like below. (HDMI mode No. 872 , pattern No.83)

2) When 3D OSD appear automatically, then select green key.

3) Don't wear a 3D Glasses, Check the picture like below.

4.8. Option selection per country

4.8.1. Overview

- Option selection is only done for models in NON-AU

4.8.2.Method

(1) Press "ADJ" key on the Adjustment remote control, then select Country Group Menu.
(2) Depending on destination, select Country Group Code or Country Group then on the lower.

4.9. Tool Option selection

- Method : Press "ADJ" key on the Adjustment remote control, then select Tool option.

4.10. Ship-out mode check(In-stop)

After final inspection, press "IN-STOP" key of the Adjustment remote control and check that the unit goes to Stand-by mode.

4.11. GND and Internal Pressure check

4.11.1. Method

(1) GND & Internal Pressure auto-check preparation
- Check that Power Cord is fully inserted to the SET. (If loose, re-insert)

(2) Perform GND & Internal Pressure auto-check
- Unit fully inserted Power cord, Antenna cable and A/V arrive to the auto-check process.
- Connect D-terminal to AV JACK TESTER
- Auto CONTROLLER(GWS103-4) ON
- Perform GND TEST
- If NG, Buzzer will sound to inform the operator.
- If OK, changeover to I/P check automatically. (Remove CORD, A/V form AV JACK BOX.)
- Perform I/P test
- If NG, Buzzer will sound to inform the operator.
- If OK, Good lamp will lit up and the stopper will allow the pallet to move on to next process.

4.11.2. Checkpoint

▪ TEST voltage
- GND: 1.5 KV / min at 100 mA
- SIGNAL: 3 KV / min at 100 mA

▪ TEST time: 1 second
▪ TEST POINT
- GND TEST = POWER CORD GND & SIGNAL CABLE METAL GND
- Internal Pressure TEST = POWER CORD GND & LIVE & NEUTRAL

▪ LEAKAGE CURRENT: At 0.5 mArms

5. Audio

Measurement condition:
(1) RF input: Mono, 1 KHz sine wave signal, 100 % Modulation
(2) CVBS, Component: 1 KHz sine wave signal 0.5 Vrms
(3) RGB PC: 1 KHz sine wave signal 0.7 Vrms

No.	Item	Min	Typ	Max	Unit	
1	Audio practical max Output, L/R (Distortion=10% max Output)		10	12	W	EQ Off AVL Off Clear Voice Off
			8.10	10.8	Vrms	
2	Speaker (8Ω Impedance)		10	12	W	EQ On AVL On Clear Voice On

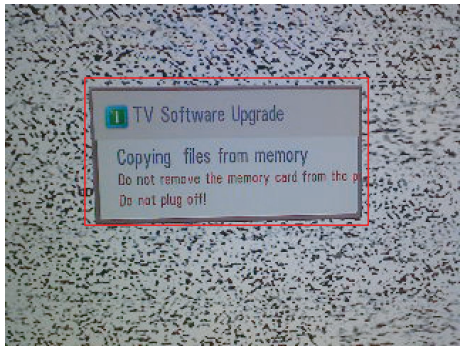
6. USB S/W download(Service only)

(1) Put the USB Stick to the USB socket.

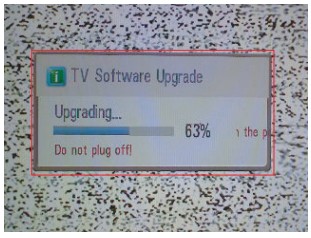
(2) Automatically detecting update file in USB Stick.

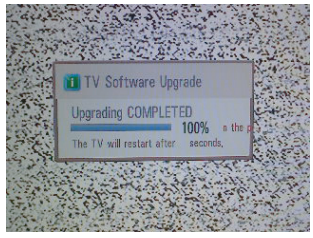
- If your downloaded program version in USB Stick is Low, it didn't work. But your downloaded version is High, USB data is automatically detecting.

(3) Show the message "Copying files from memory".



(4) Updating is starting.





(5) Updating Completed, The TV will restart automatically.

(6) If your TV is turned on, check your updated version and Tool option. (explain the Tool option, next stage)

* If downloading version is more high than your TV have, TV can lost all channel data. In this case, you have to channel recover. if all channel data is cleared, you didn't have a DTV/ATV test on production line.

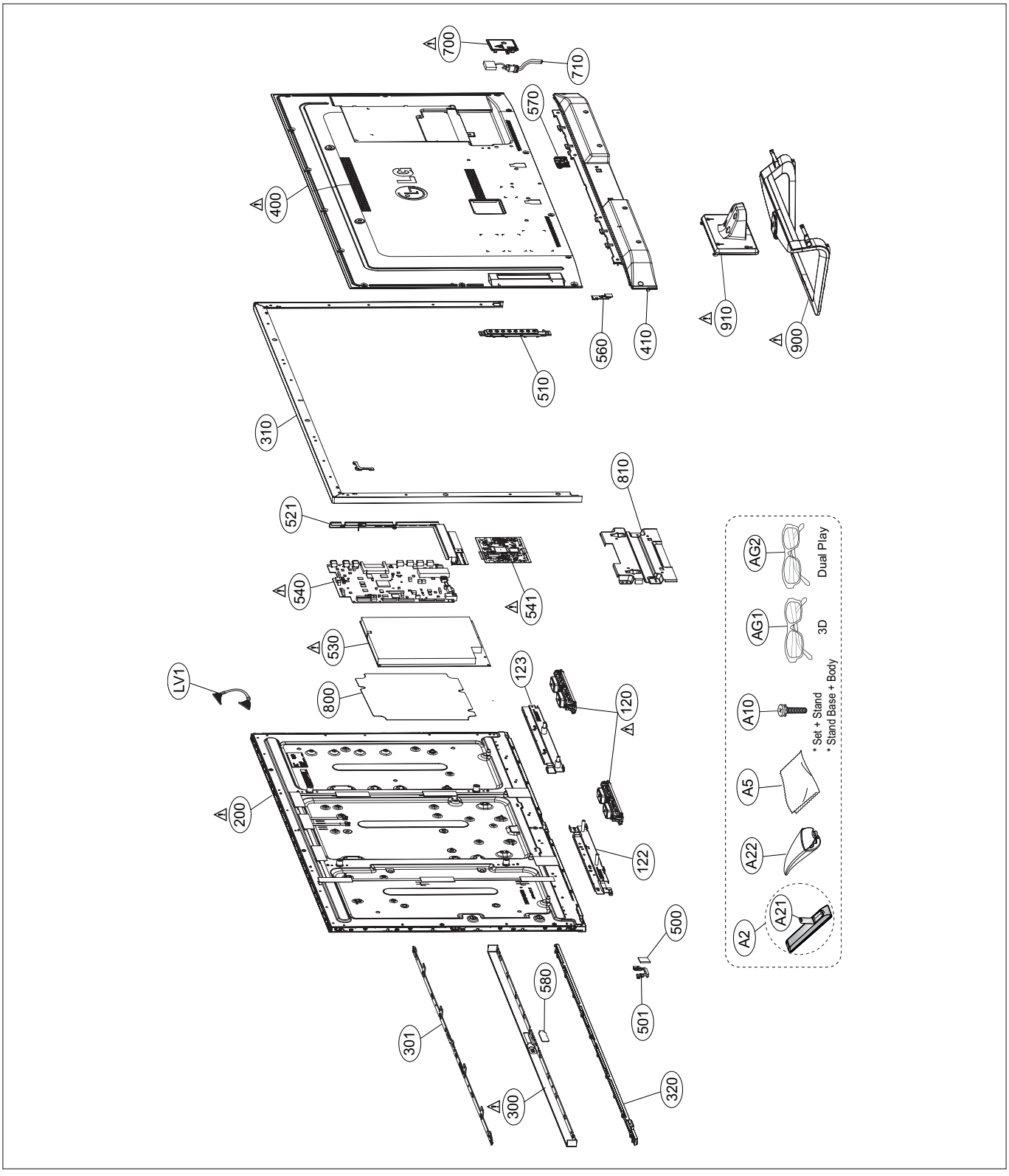
* After downloading, have to adjust TOOL OPTION again.

1) Push "IN-START" key in service remote control.
2) Select "Tool Option 1" and push "OK" key.
3) Punch in the number. (Each model has their number.)

EXPLODED VIEW

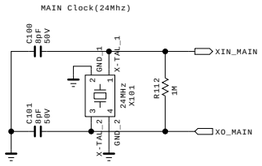
IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and EXPLODED VIEW.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent X-RADIATION, Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.

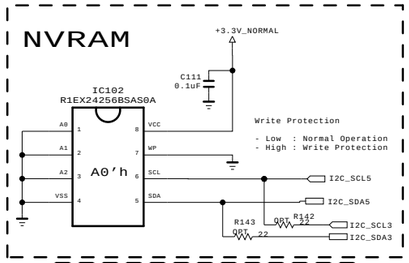


System Configuration

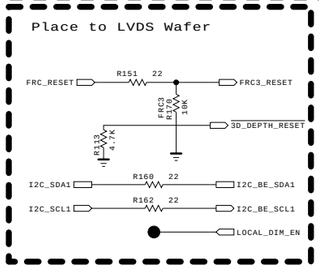
Clock for LG1152



NVRAM

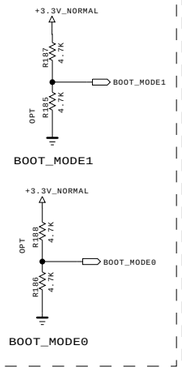


Place to LVDS Wafer

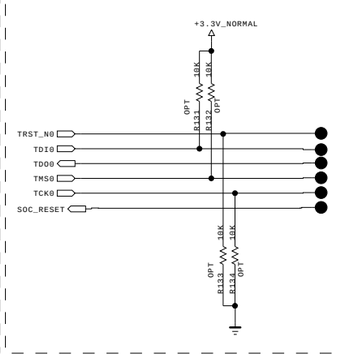


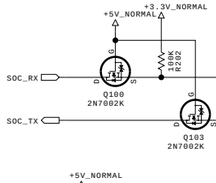
PLL SET[1:0] ==> Internal Pull-UP. N.C is high
00 : CPU clock(1056Mhz), Main0,1/2 DDR (792/792 Mhz)
01 : CPU clock(792Mhz), Main0,1/2 DDR (672/792 Mhz)
10 : CPU clock(1152Mhz), Main0,1/2 DDR (792/672 Mhz)
11 : CPU clock(984Mhz), Main0,1/2 DDR (792/792 Mhz)

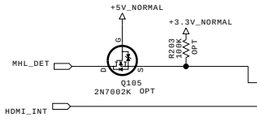
BOOT MODE
"11" or "01" : NOR
"10" : eMMC
"00" : NAND

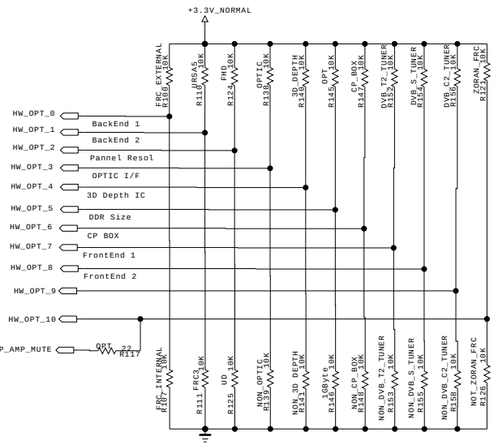


JTAG I/F FOR MAIN





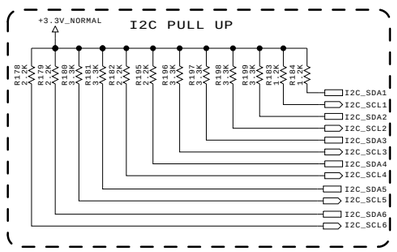




	NO_FRC	SoC internal FRC	LG FRC3	URSA5
MODEL_OPT_0	0	0	1	1
MODEL_OPT_1	0	1	0	1

		HIGH	LOW
MODEL_OPT_2		FHD	UD
MODEL_OPT_3		OPTIC	NON_OPTIC
MODEL_OPT_4	3D DEPTH	3D_Depth_IC	NON_3D_Depth_IC
MODEL_OPT_5	DDR	Reserved	DDR_Default
MODEL_OPT_6	CP BOX	Enable	Disable
MODEL_OPT_7	T2 Tuner	Support	Not Support
MODEL_OPT_8	S Tuner	Support	Not Support
MODEL_OPT_9	C2 Tuner	Support	Not Support
MODEL_OPT_10	Zoran FRC (For UD)	Support	Not Support

MODEL OPTION 8 is just for CP Box
It should not be appiled at MP



THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET
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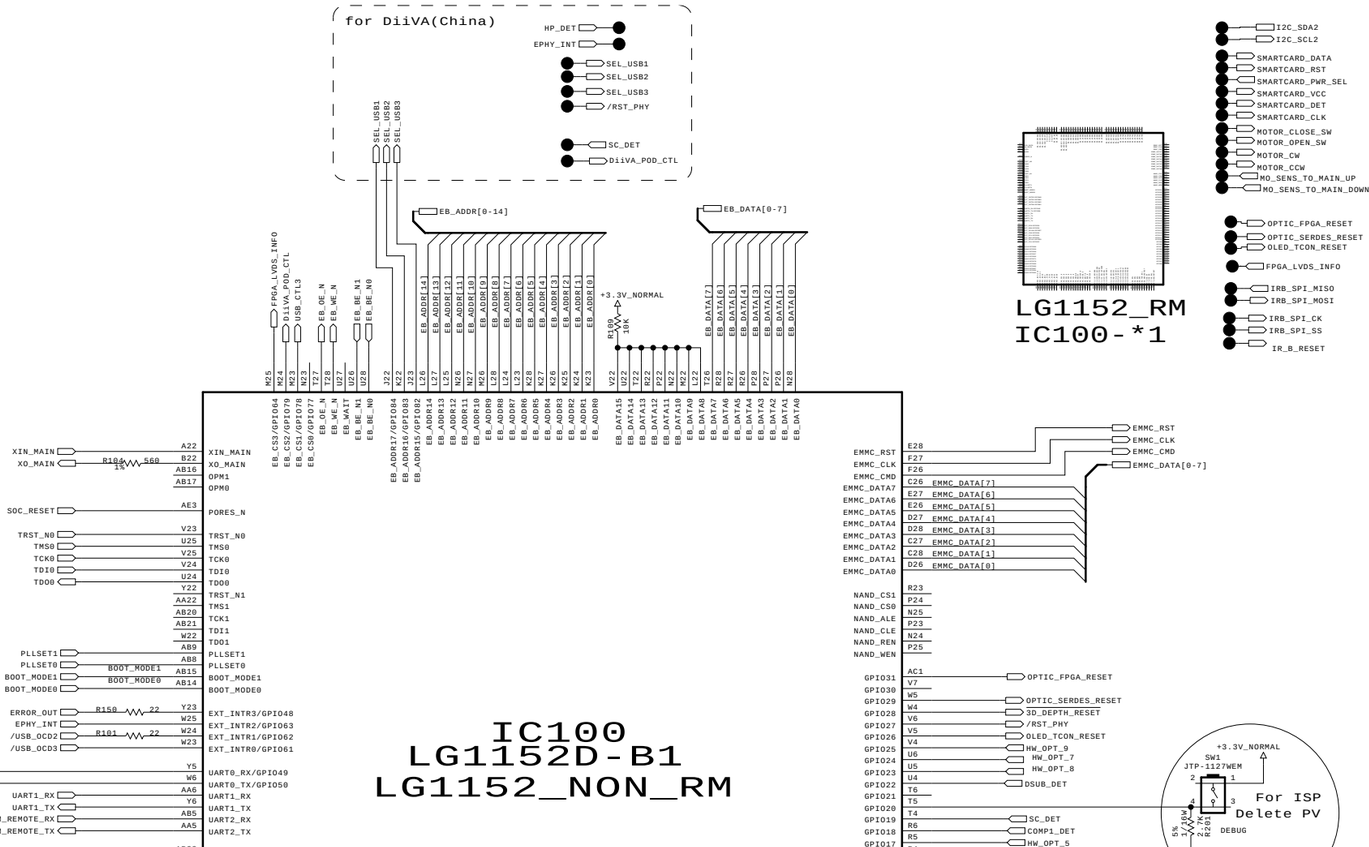
LG ELECTRONICS

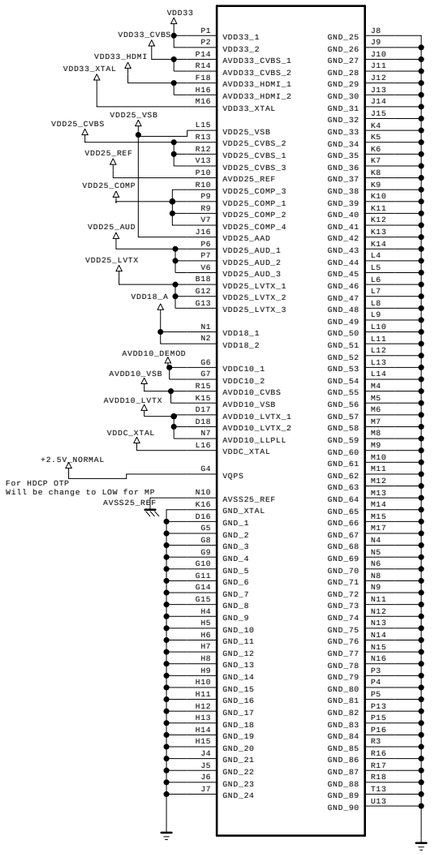
IC100
LG1152D-B1
LG1152_NON_RM



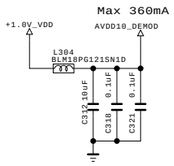
MODEL	LG1152 B1	DATE	
BLOCK	MAIN & GPIO	SHEET	1

LG1152A

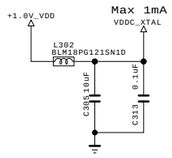
IC101
LG1152AN-B2



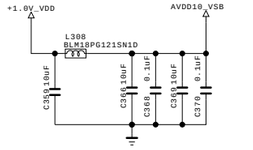
Max 360mA



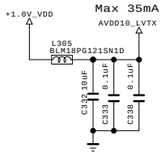
Max 1mA



Max 12mA

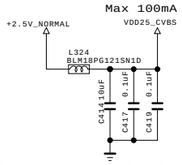


Max 35mA



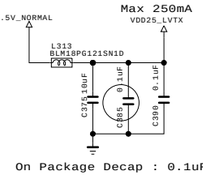
On Package Decap : 0.1uF *1ea

Max 100mA



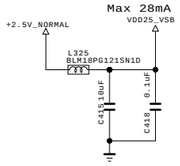
On Package Decap : 0.1uF *1ea

Max 250mA



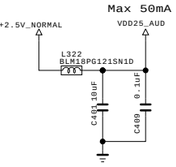
On Package Decap : 0.1uF *1ea

Max 28mA



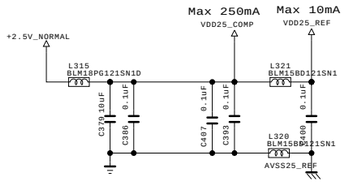
On Package Decap : 0.1uF *1ea

Max 50mA



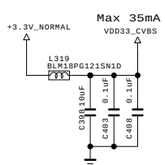
On Package Decap : 0.1uF *1ea

Max 250mA Max 10mA



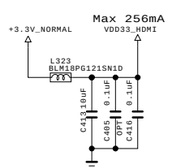
On Package Decap : 0.1uF *1ea

Max 35mA



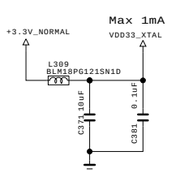
On Package Decap : 0.1uF *1ea

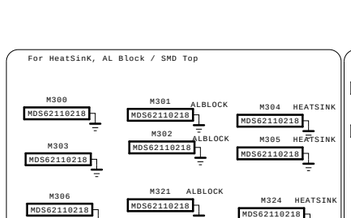
Max 256mA

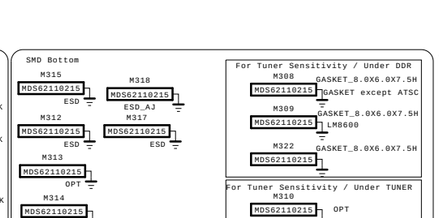


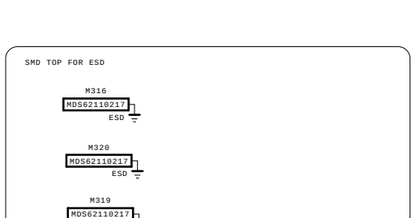
On Package Decap : 0.1uF *1ea

Max 1mA









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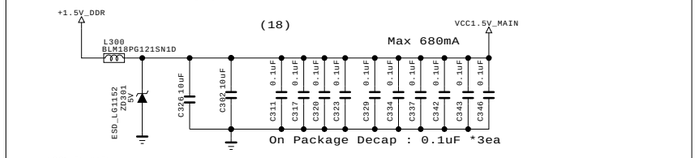
11/05/31

SECRET
LGElectronics

LG ELECTRONICS

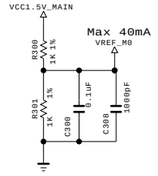
+1.5V_Bypass Cap



Max 680mA

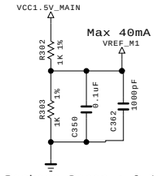
On Package Decap : 0.1uF *3ea

Max 40mA



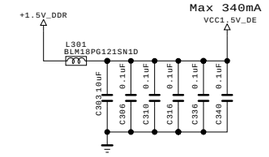
On Package Decap : 0.1uF *1ea

Max 40mA



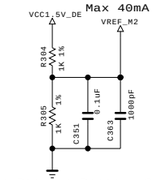
On Package Decap : 0.1uF *1ea

Max 340mA



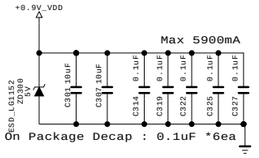
On Package Decap : 0.1uF *2ea

Max 40mA



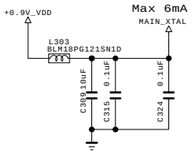
On Package Decap : 0.1uF *1ea

Max 5900mA

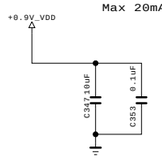


On Package Decap : 0.1uF *6ea

Max 6mA

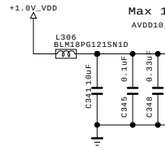


Max 20mA



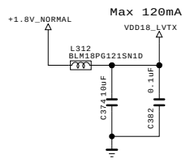
On Package Decap : 0.1uF *1ea

Max 1320mA



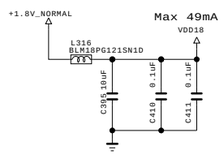
On Package Decap : 0.1uF *3ea

Max 120mA



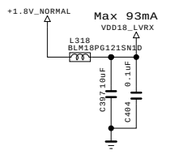
On Package Decap:0.1uF *1ea

Max 49mA



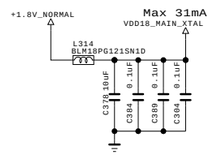
On Package Decap:0.1uF *1ea

Max 93mA

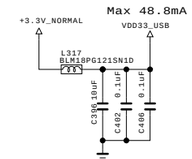


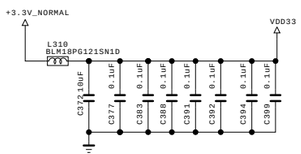
On Package Decap:0.1uF *1ea

Max 31mA



Max 48.8mA

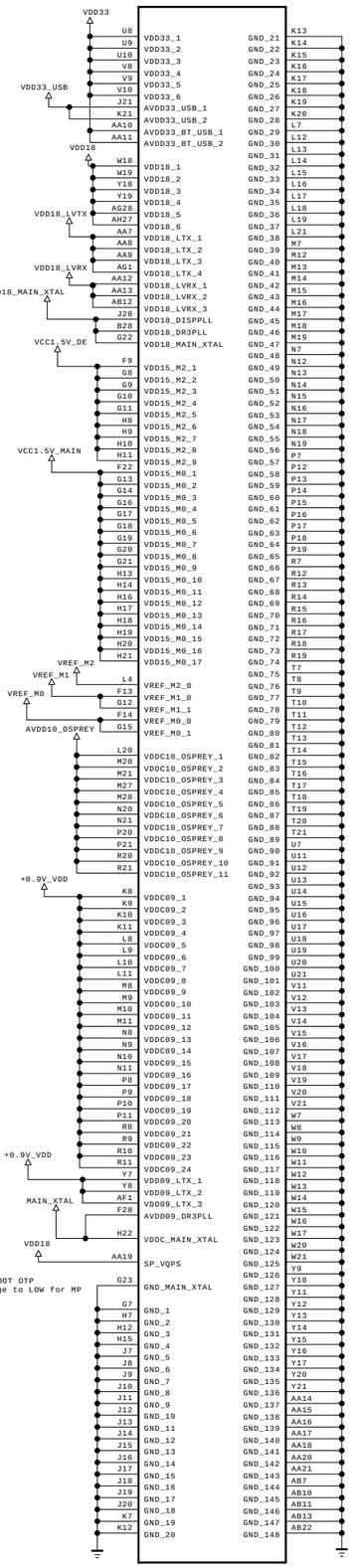




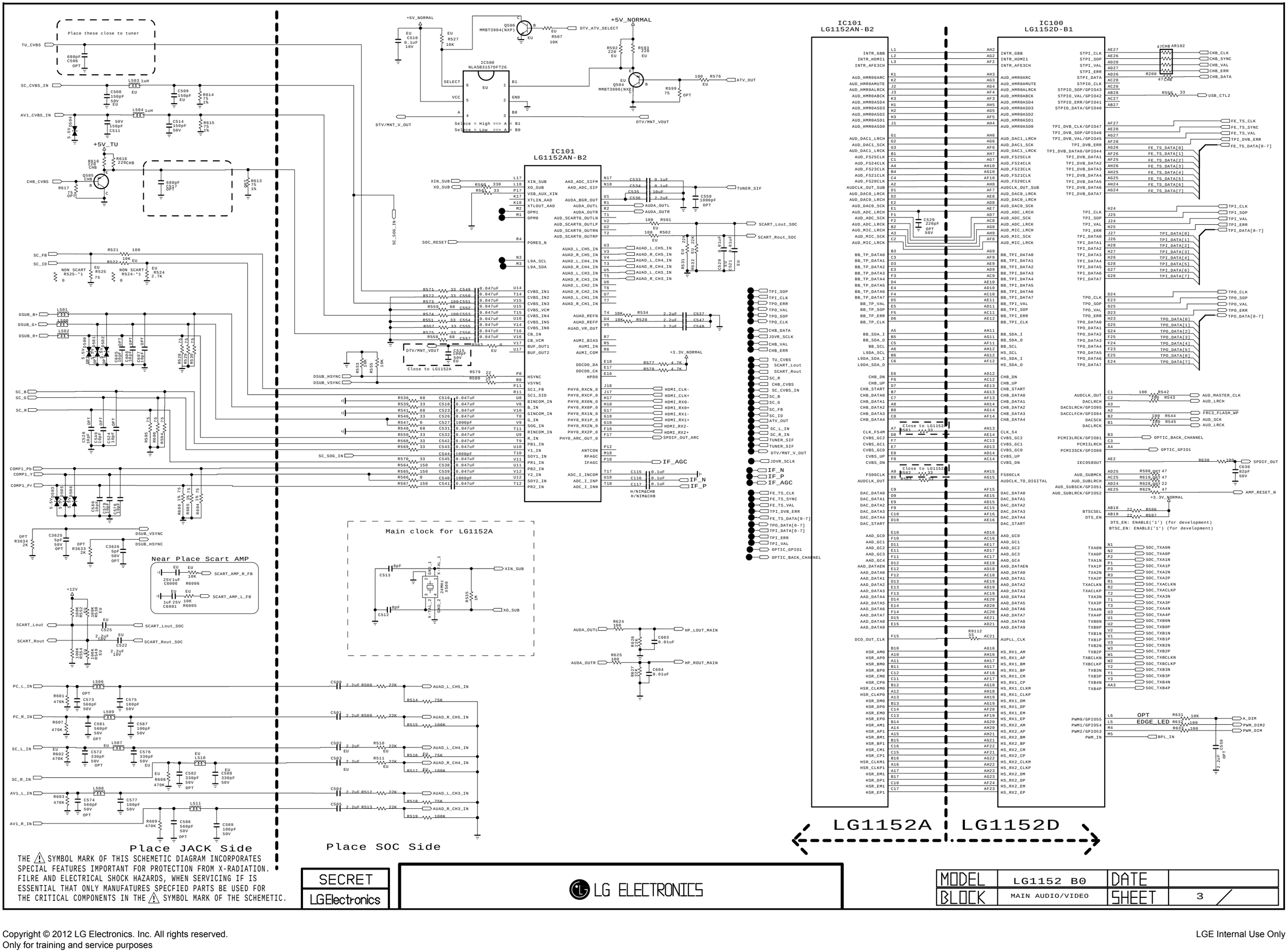
On Package Decap : 0.1uF *1ea

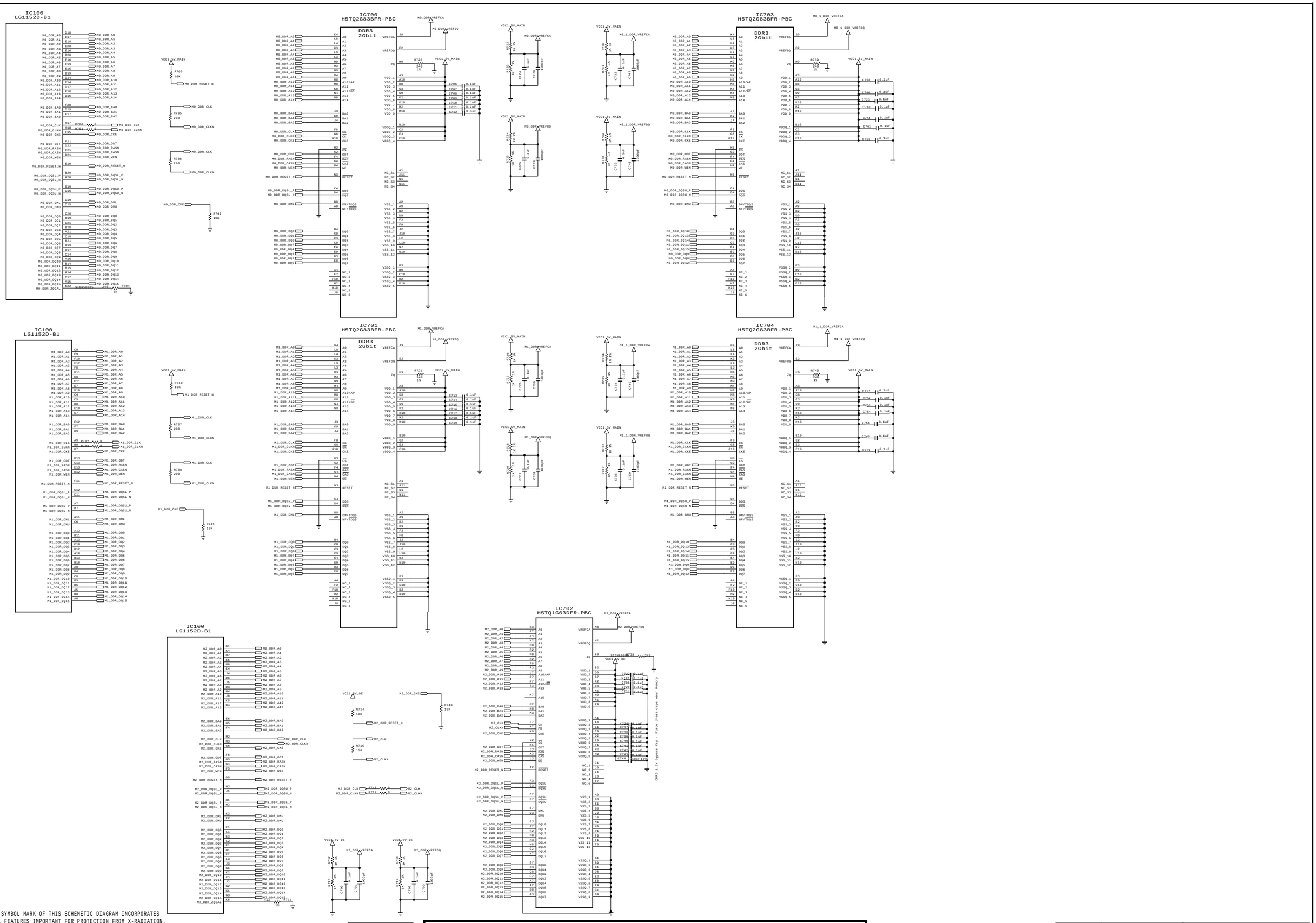
LG1152D

IC100
LG1152D-B1

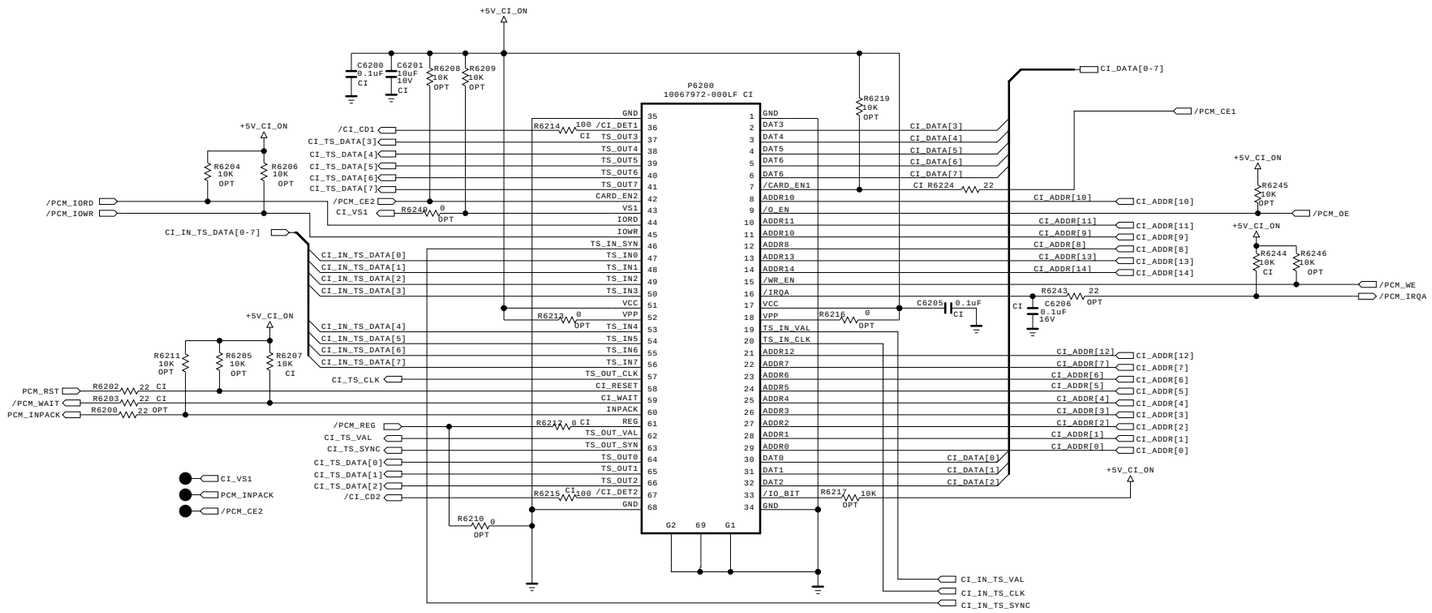


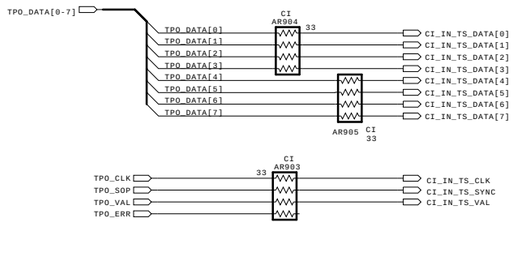
MODEL	LG1152	DATE	
BLOCK	MAIN POWER	SHEET	3



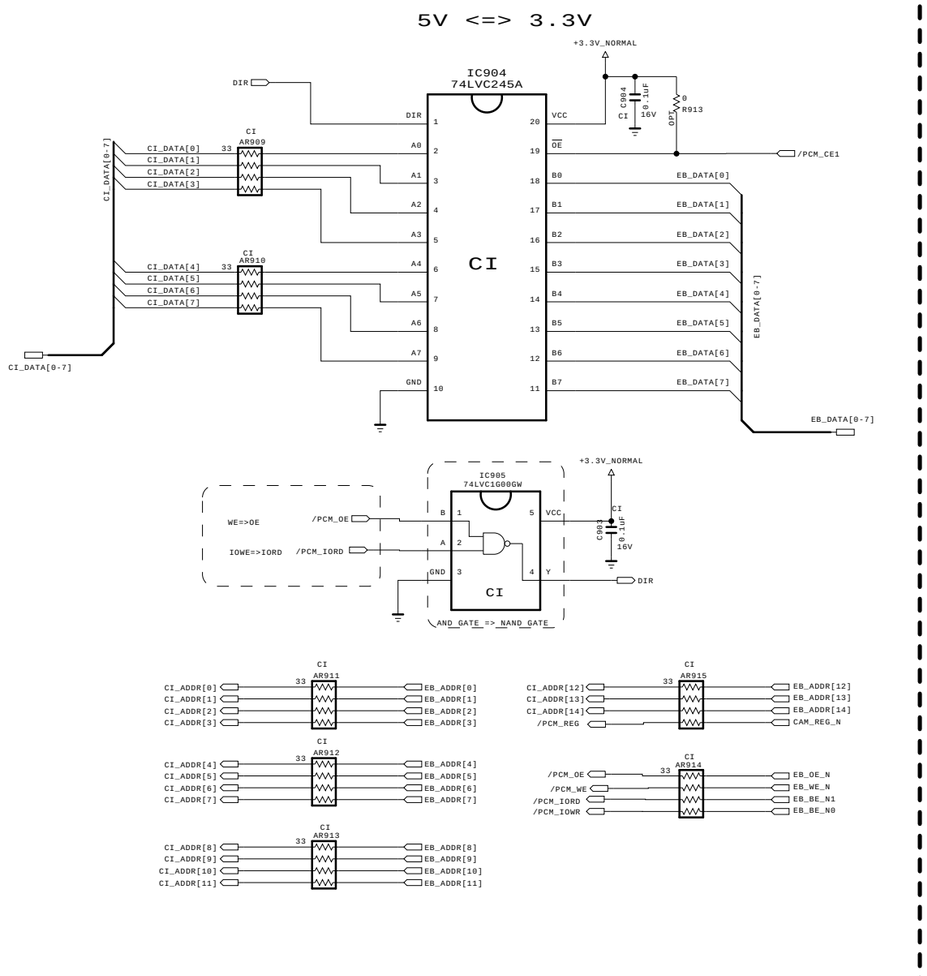


THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

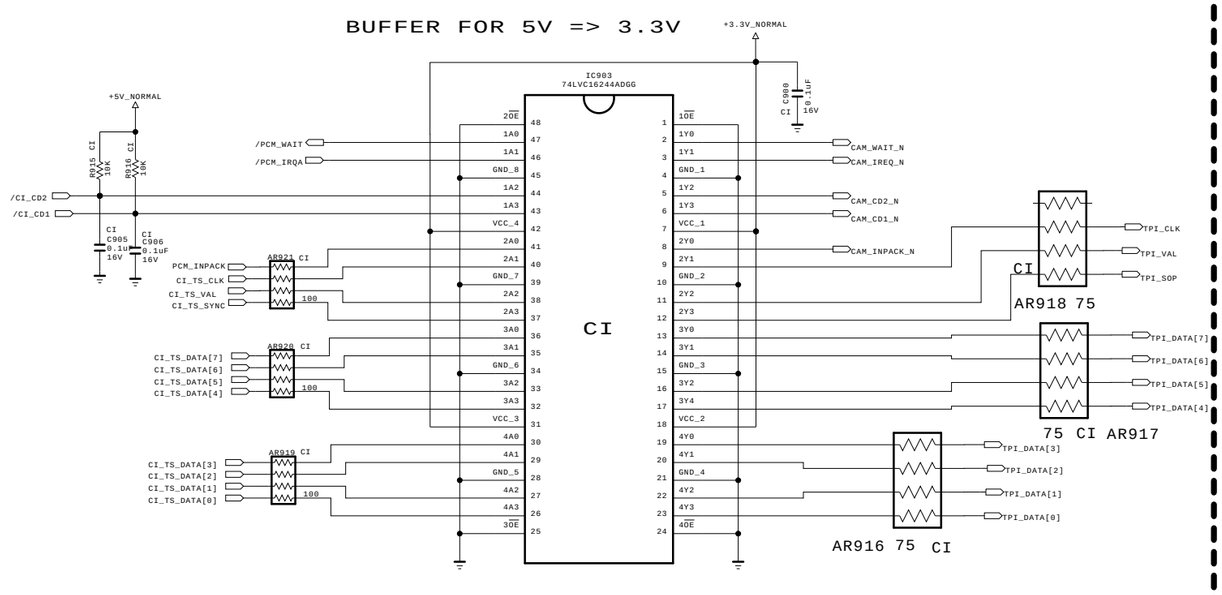




CI HOST I/F



BUFFER FOR 5V => 3.3V



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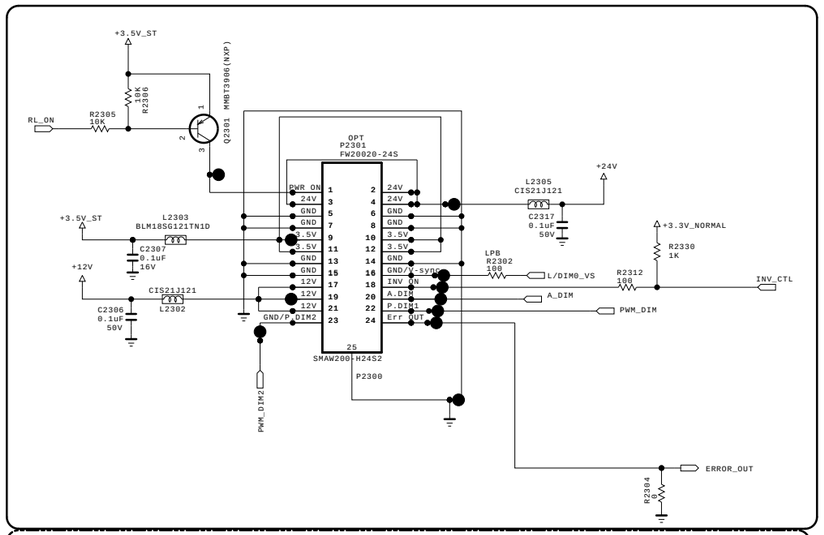
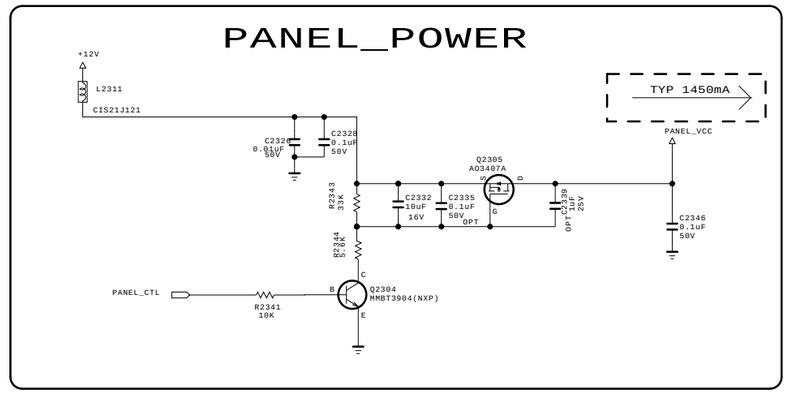
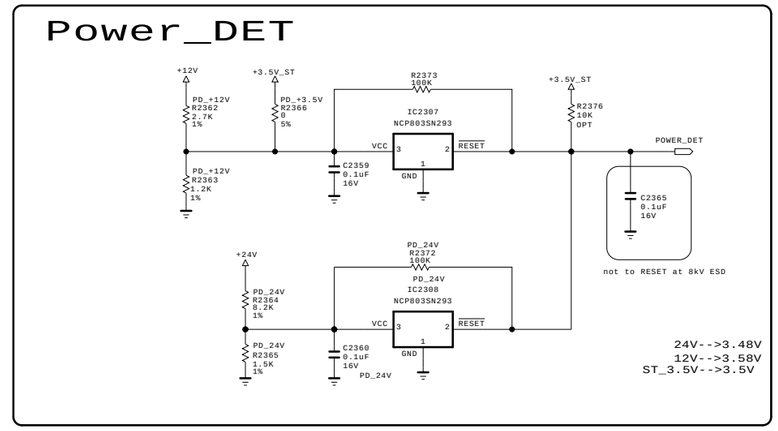
SECRET
LGElectronics

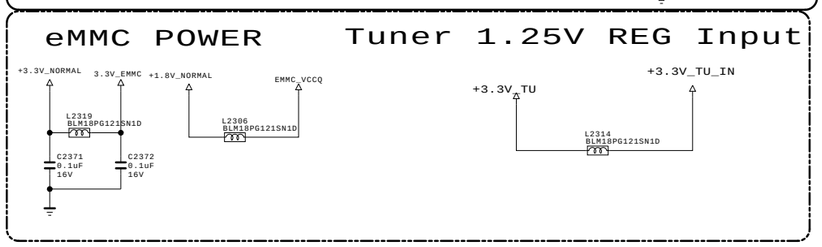
LG ELECTRONICS

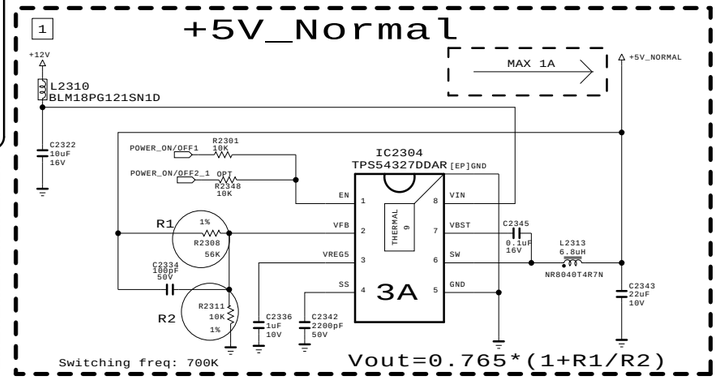
MODEL		DATE	
BLOCK		SHEET	/

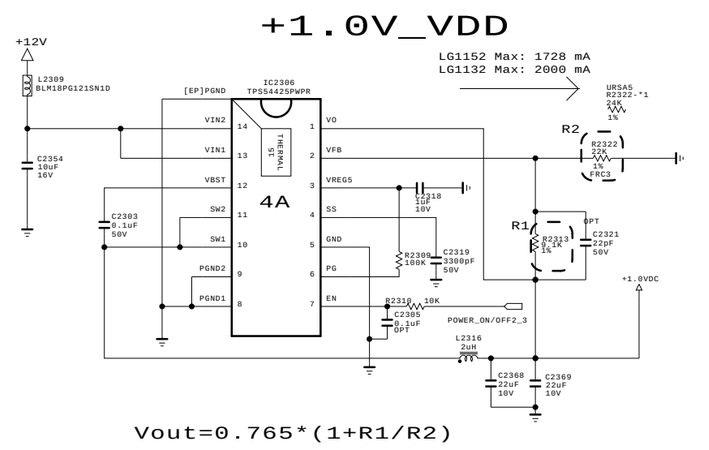


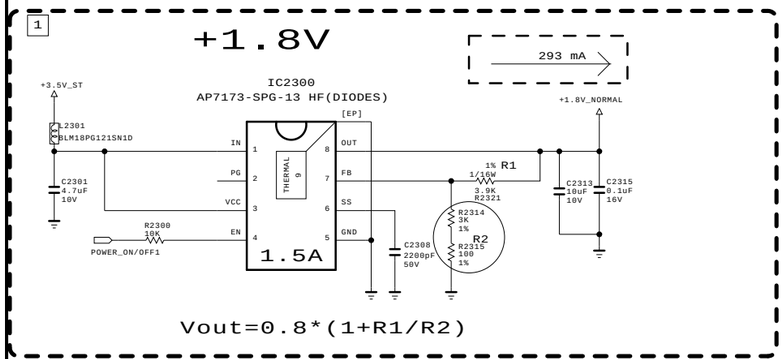


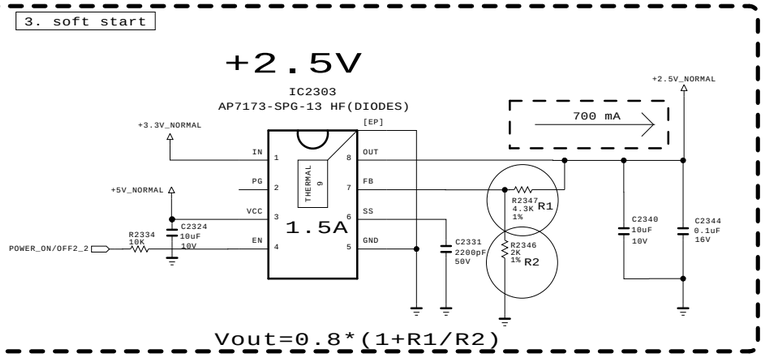


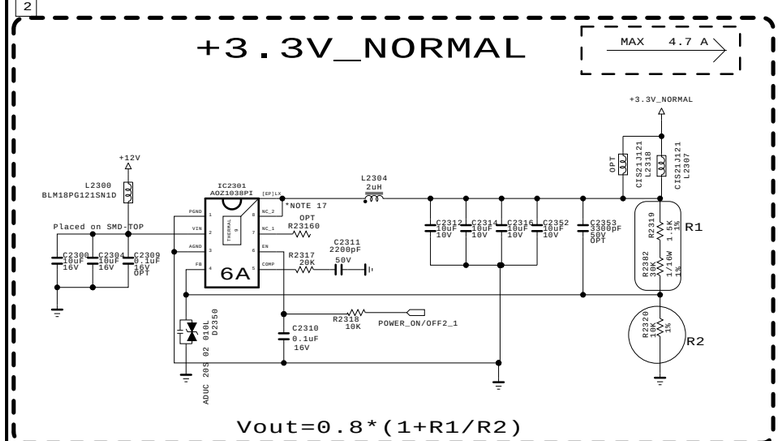


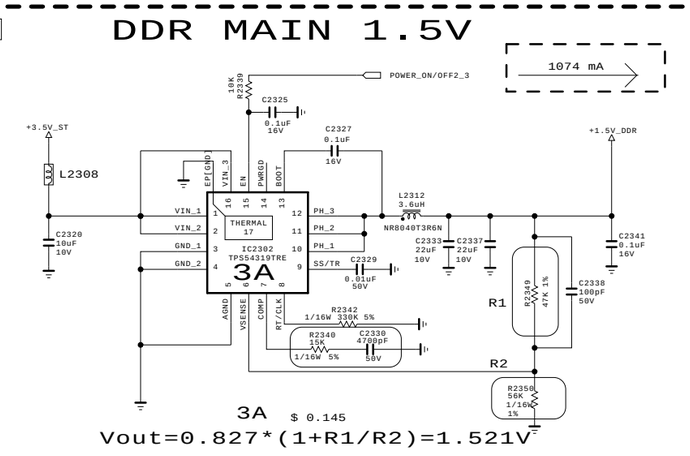


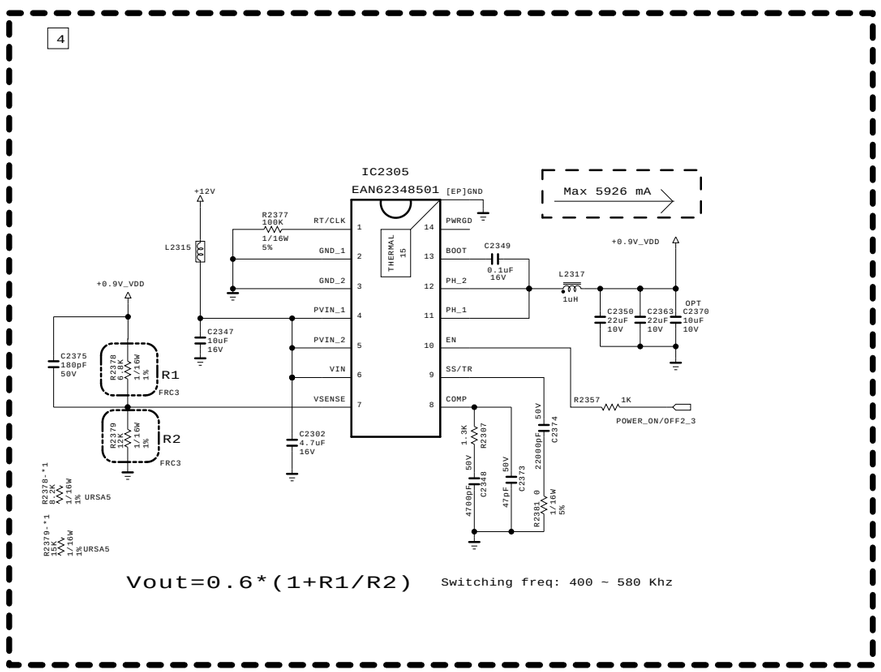












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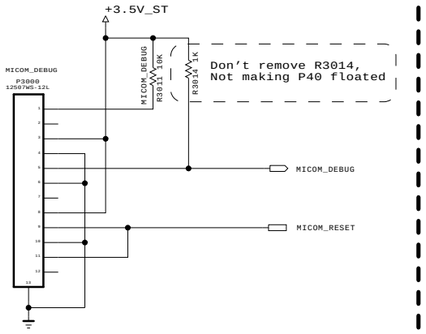
SECRET
LGElectronics

LG ELECTRONICS

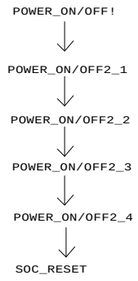
MODEL	LG1152	DATE	
BLOCK	POWER	SHEET	/

Renesas MICOM

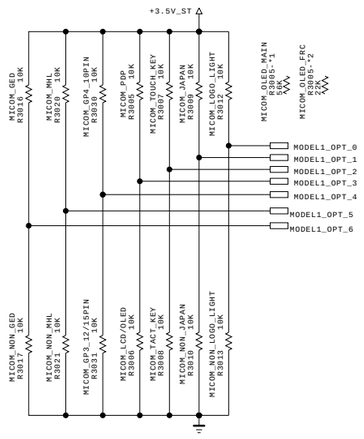
For Debug



GP4 High/MID Power SEQUENCE



MICOM MODEL OPTION

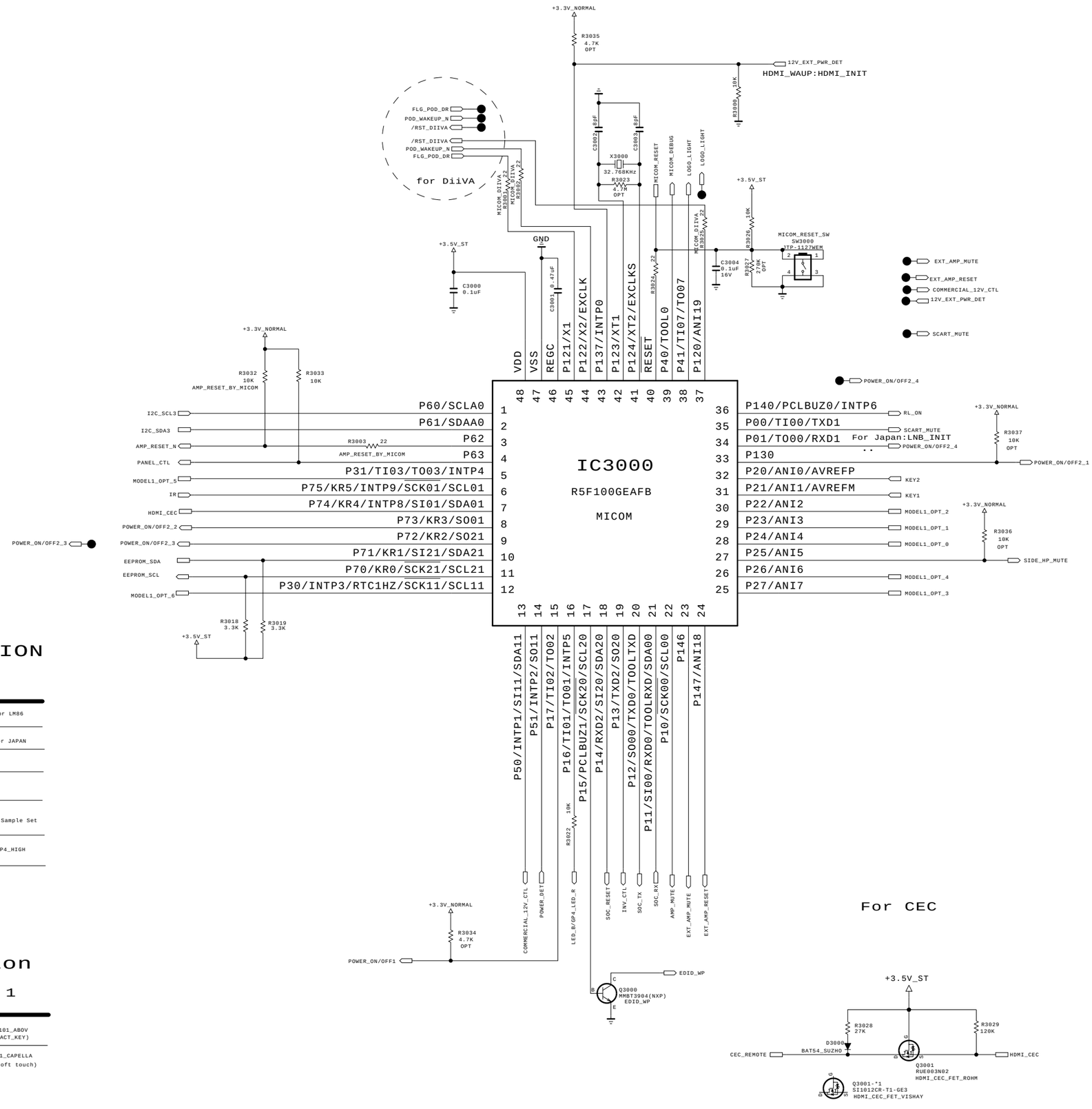


MICOM MODEL OPTION

	0	1	
MODEL_OPT_0	NON LOGO_LIGHT	LOGO_LIGHT	For LM86
MODEL_OPT_1	NON JAPAN	JAPAN	For JAPAN
MODEL_OPT_2	TACT_KEY	TOUCH_KEY	
MODEL_OPT_3	LCD / OLED	PDP	
MODEL_OPT_4	IR Wafer 12/15Pin (GP3_Soft touch)	IR Wafer 10Pin (GP4_TOOL)	For Sample Set
MODEL_OPT_5	NON_MHL	MHL	GP4_HIGH
MODEL_OPT_6	NON_GED	GED	

Eye Sensor Option

MODEL_OPT_4 / MODEL_OPT_2	0	1
0	N/A	MC8101_ABOV (TACT_KEY)
1	CM3231_CAPELLA (GP3 Soft touch)	CM3231_CAPELLA (GP4 Soft touch)



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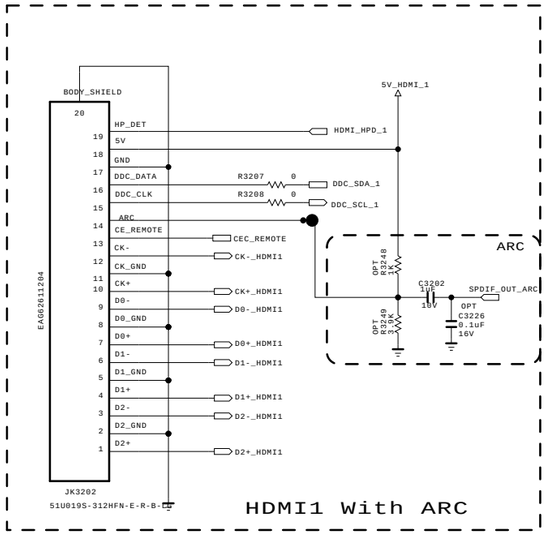
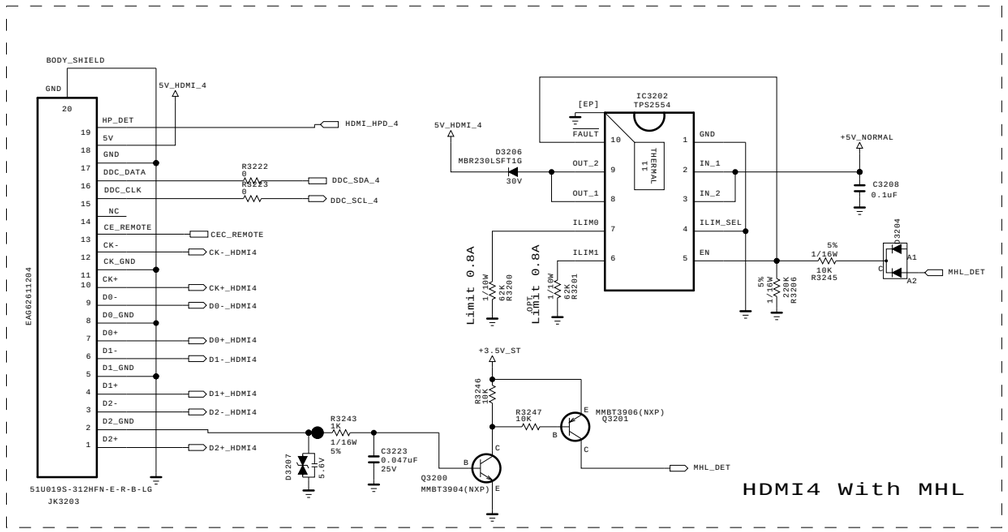
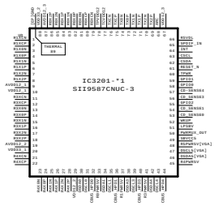
SECRET
LGElectronics

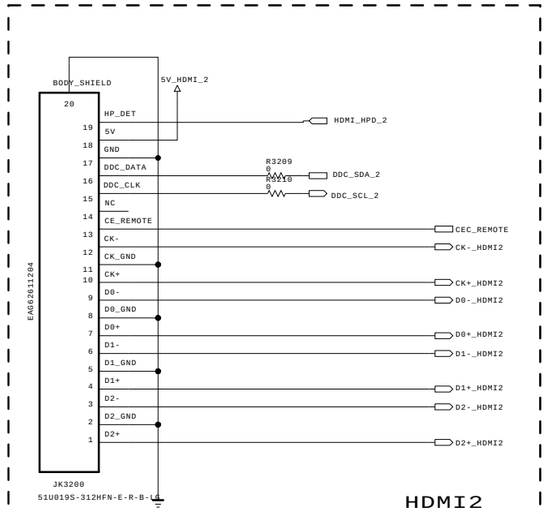
LG ELECTRONICS

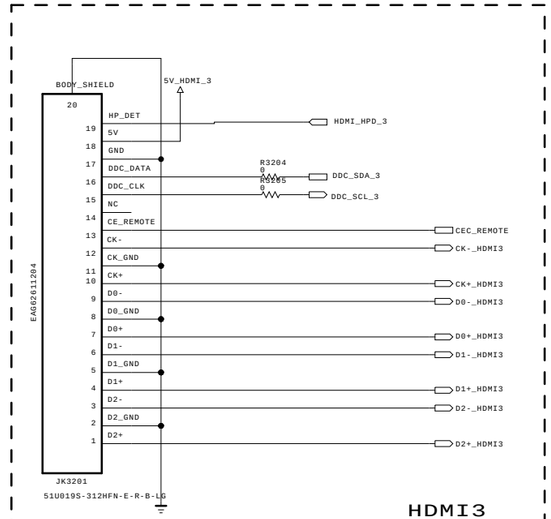
MODEL		DATE	2011.12.12
BLOCK	MICOM	SHEET	30

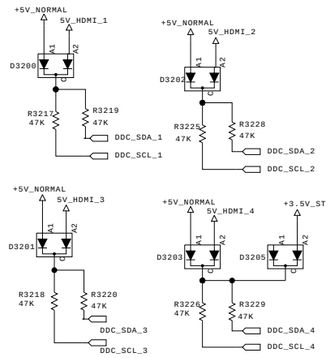


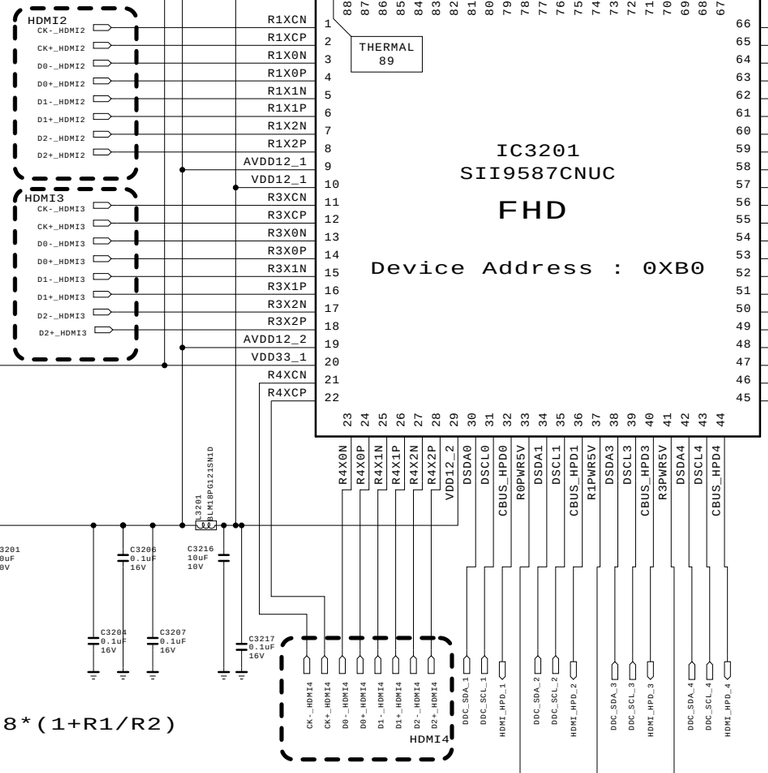












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SECRET

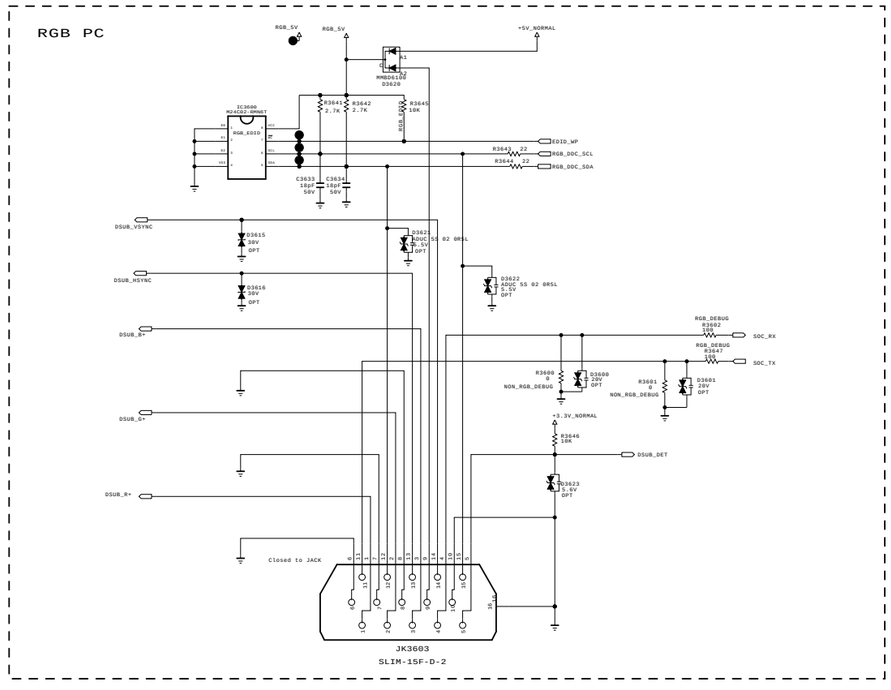
LGElectronics

LG ELECTRONICS

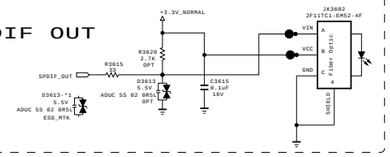
MODEL	GP4	DATE	2011.10.19
BLOCK	HDMI	SHEET	32

RGB/ PC AUDIO/ SPDIF

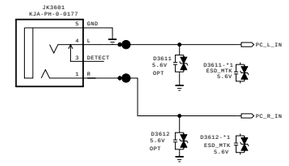
RGB PC



SPDIF OUT



PC AUDIO



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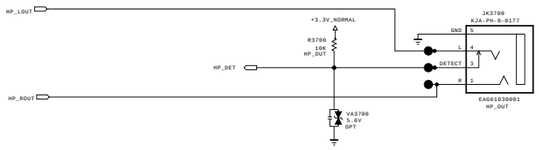
SECRET
LGElectronics

LG ELECTRONICS

MODEL	JACK HIGH / MID	DATE	2011.11.21
BLOCK		SHEET	36



ESD for MTK

ESD for LG1152

THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES
SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION.
FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS
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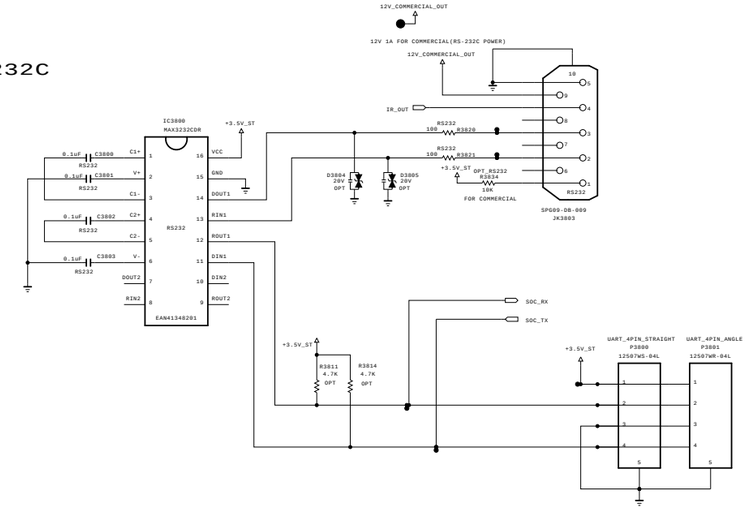
THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET
LGElectronics

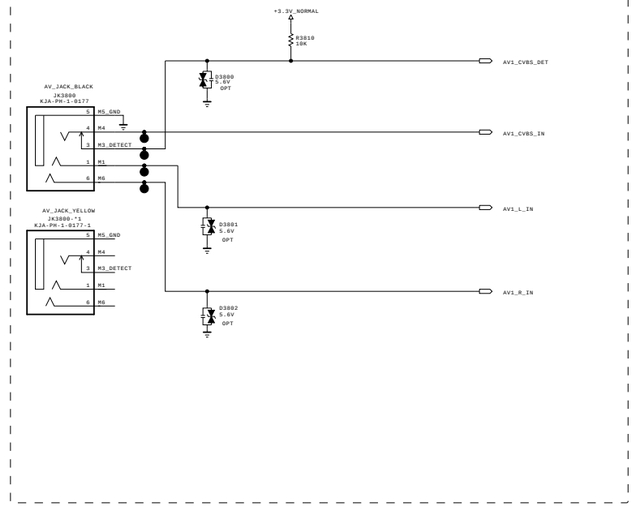
LG ELECTRONICS

MODEL	JACK_COMMON	DATE	2011.11.21
BLOCK		SHEET	37

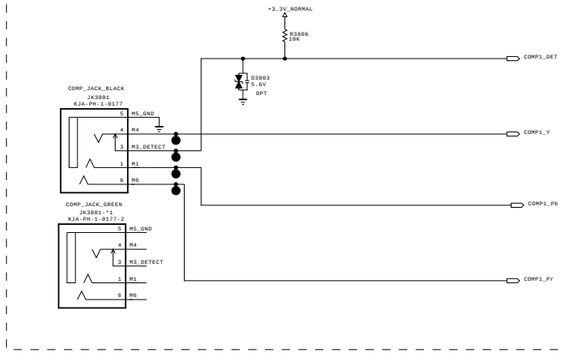
RS232C

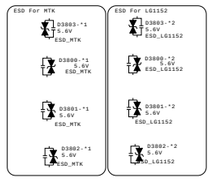


CVBS 1 PHONE JACK



COMPONENT 1 PHONE JACK





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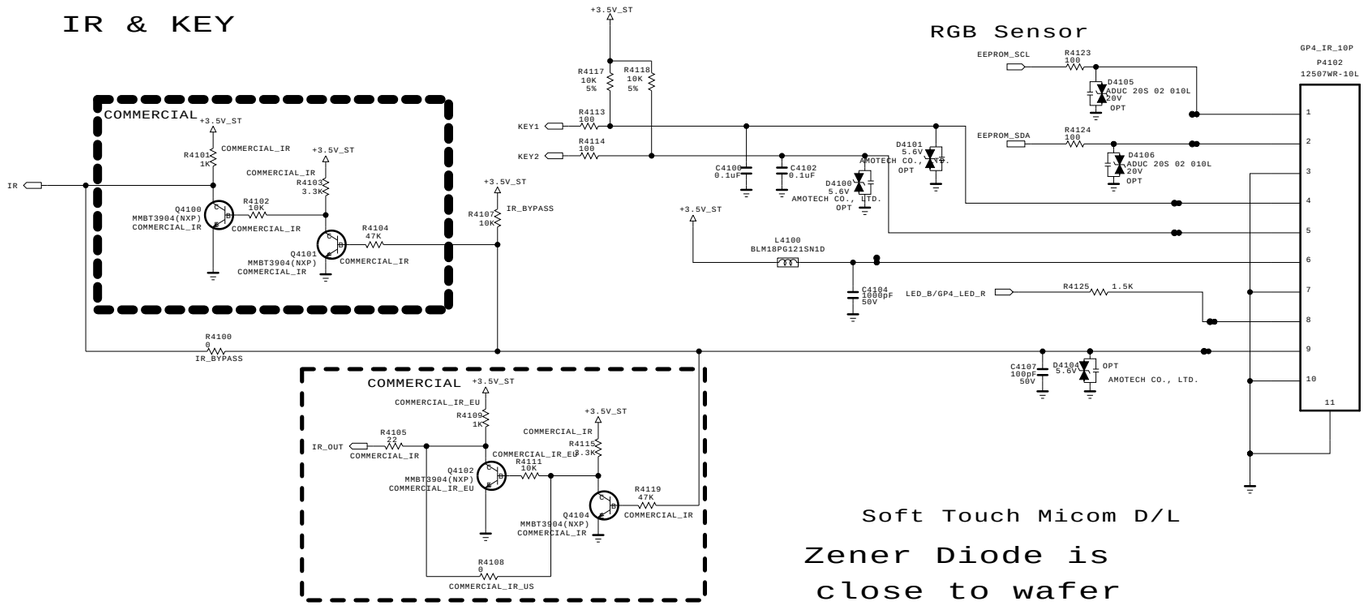
SECRET
LGElectronics

LG ELECTRONICS

MODEL	JACK_COMMON	DATE	2011.11.21
BLOCK		SHEET	38

IR & KEY

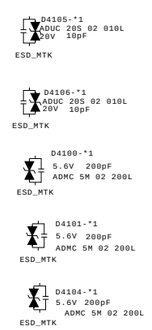


RGB Sensor

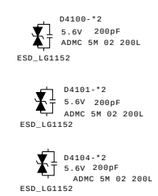
Soft Touch Micom D/L

Zener Diode is close to wafer

ESD for MTK



ESD for LG1152



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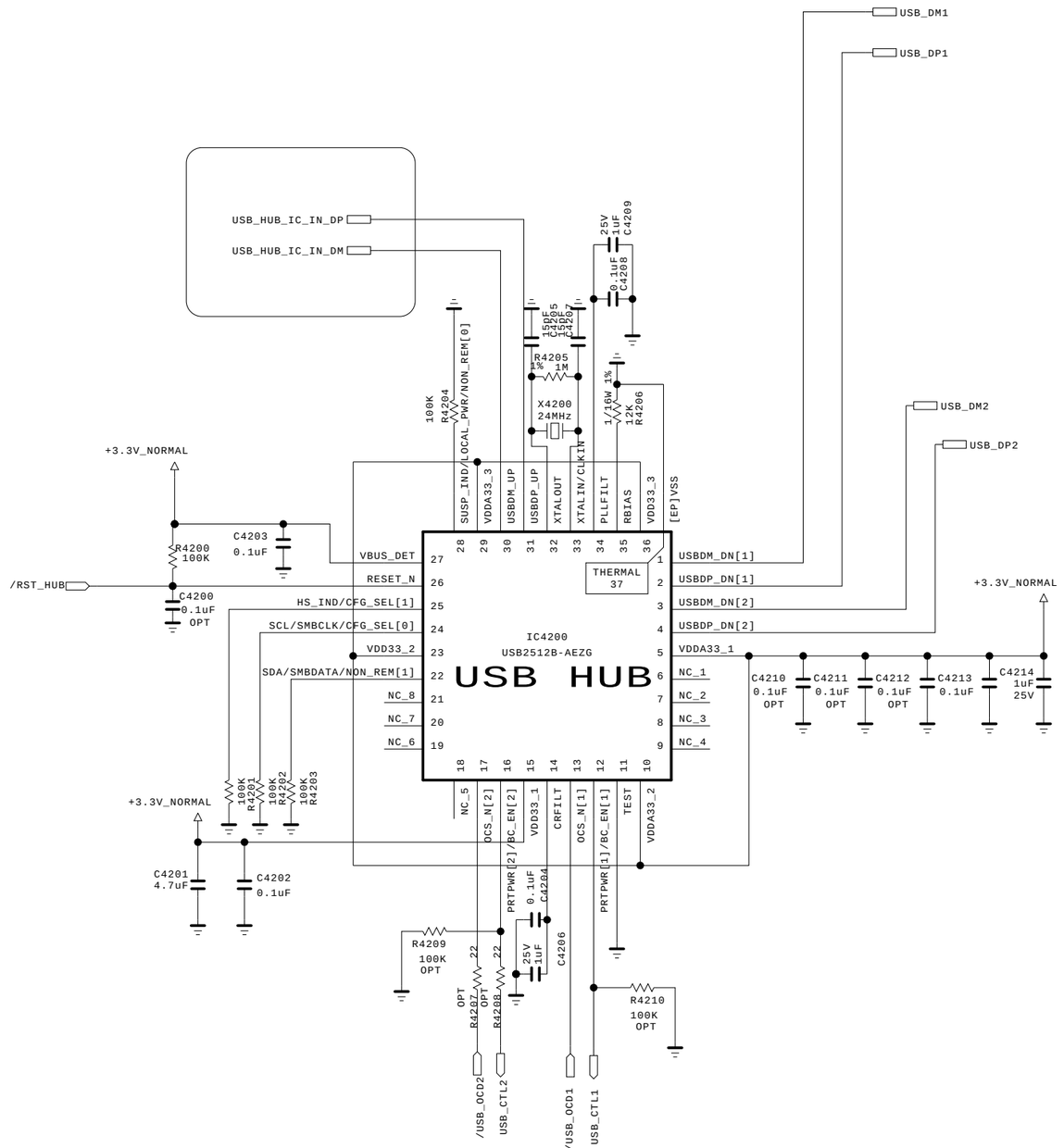
SECRET

LGElectronics

LG ELECTRONICS

MODEL	IR / KEY	DATE	2011.11.21
BLOCK		SHEET	41



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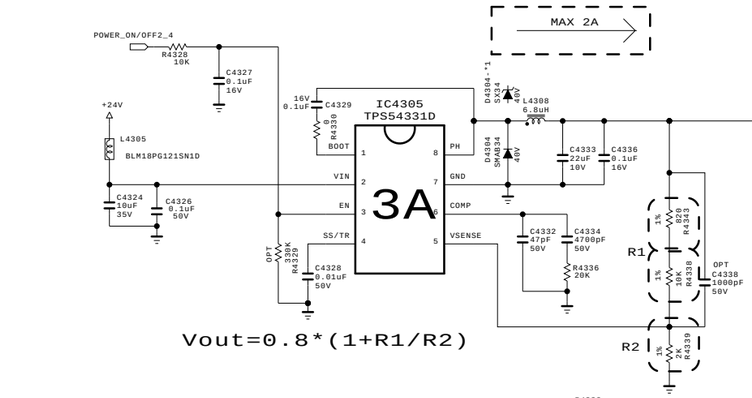
SECRET

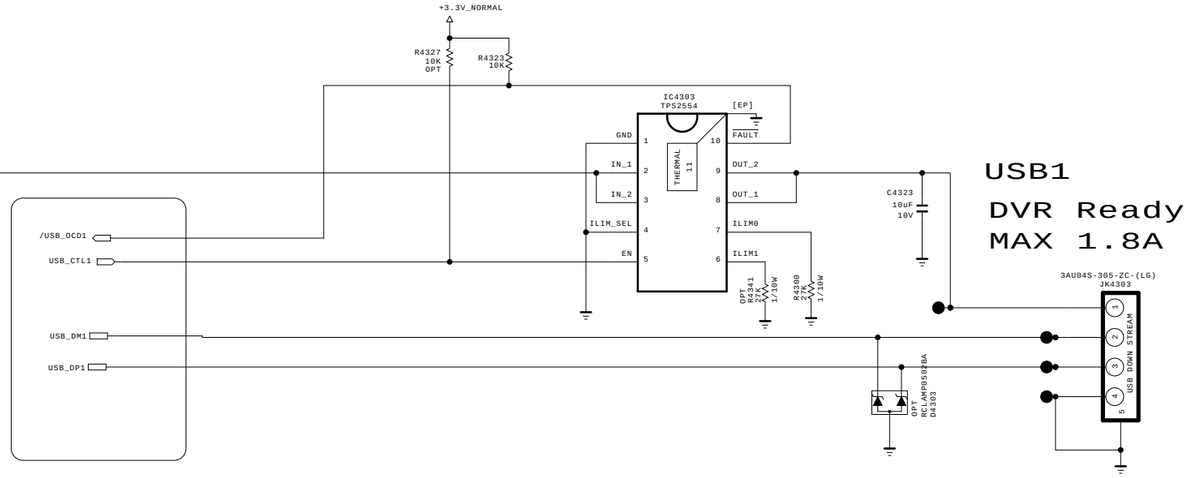
LGElectronics

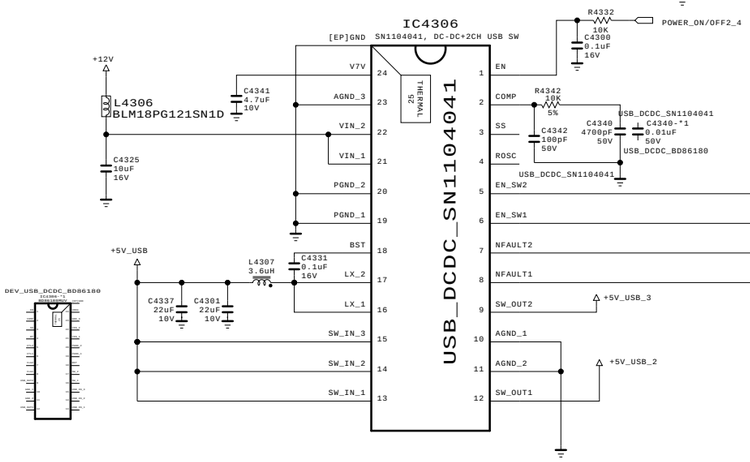
LG ELECTRONICS

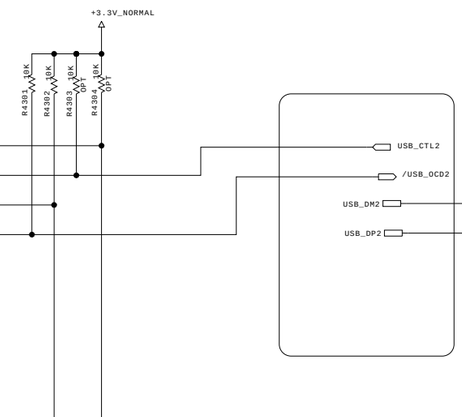
MODEL	USB3_HUB	DATE	2011.06.13
BLOCK		SHEET	42

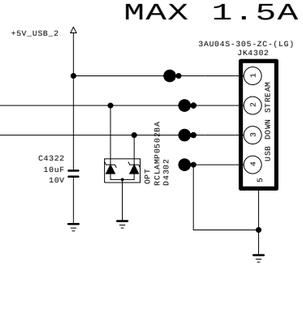
+5V_USB FOR USB1

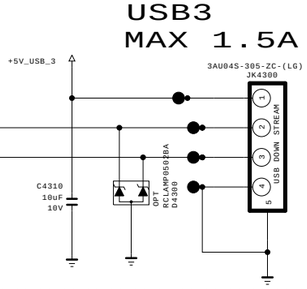


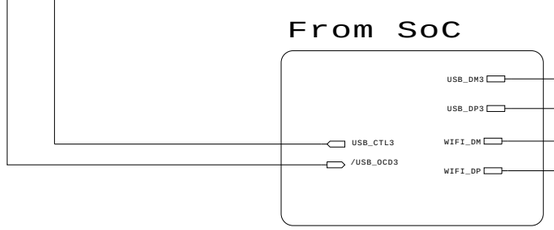


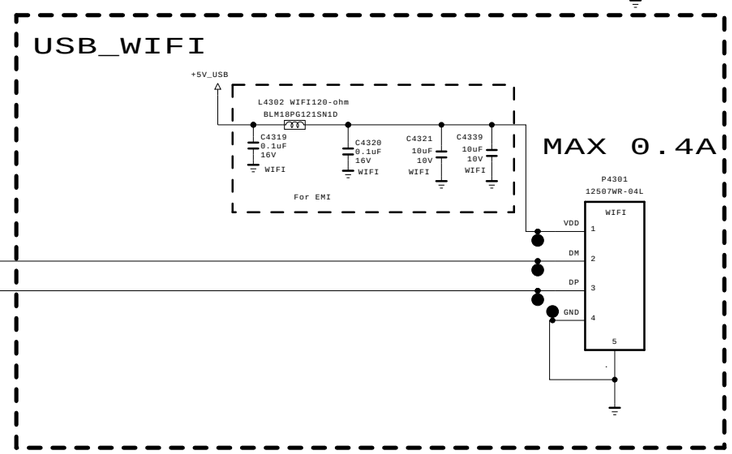






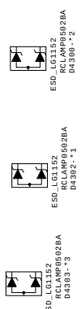






ESD for MTK

ESD for LG1152



THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

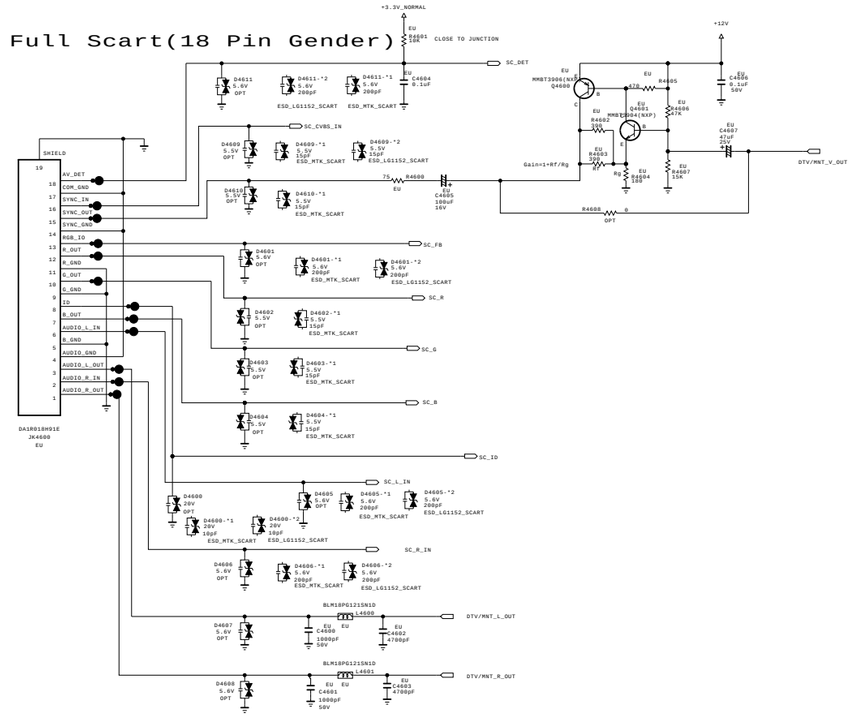
SECRET

LGElectronics

LG ELECTRONICS

MODEL	USB3_HUB_WiFi	DATE	2011.10.26
BLOCK		SHEET	43

Full Scart(18 Pin Gender)



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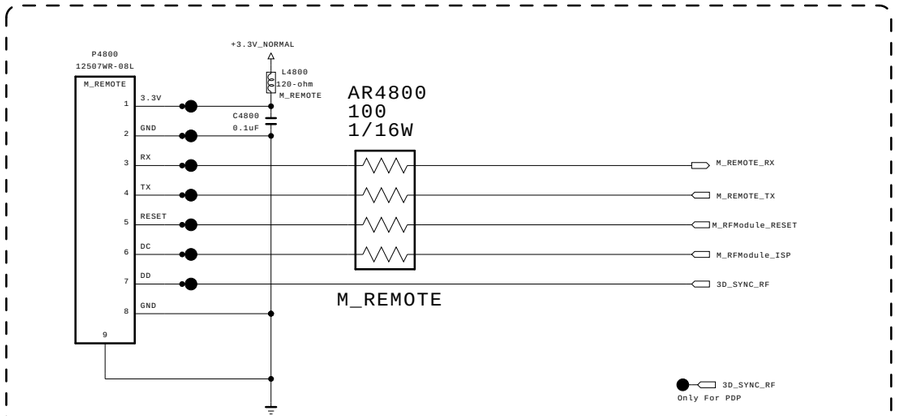
SECRET
LGElectronics

LG ELECTRONICS

MODEL	SCART GENDER	DATE	2011.10.26
BLOCK		SHEET	46

ZigBee_Radio Pulse M_REMOTE OPTION



ALL M_REMOTE OPTION

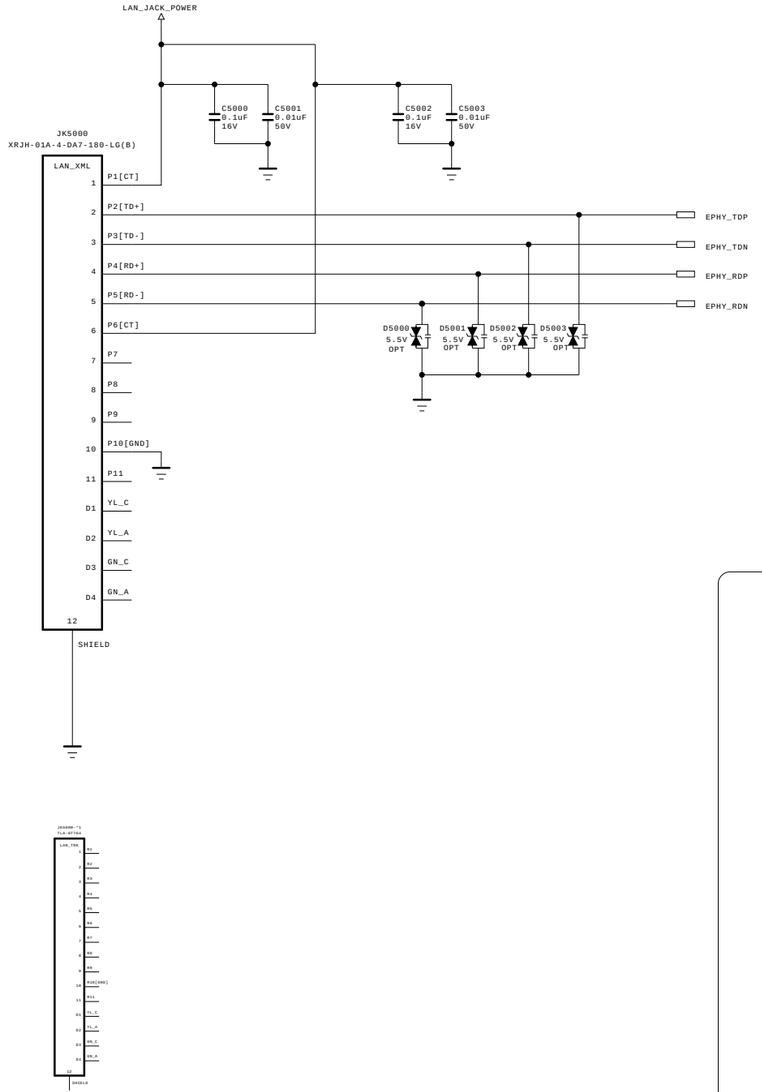
THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

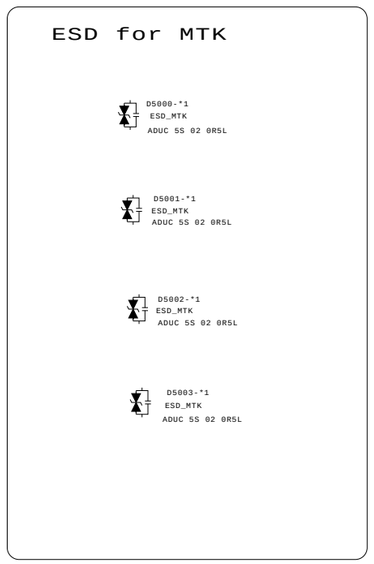
SECRET
LGElectronics

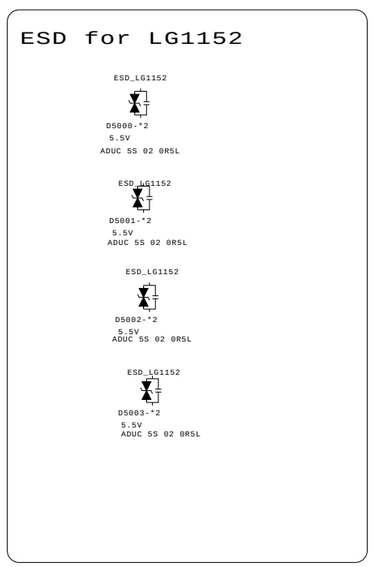
LG ELECTRONICS

MODEL	MOTION REMOTE	DATE	2011.11.21
BLOCK		SHEET	48

Ethernet Block







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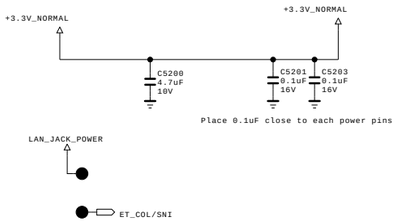
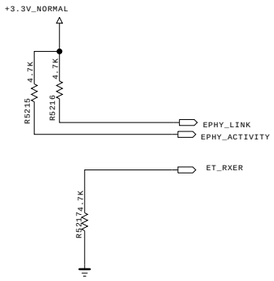
SECRET
LGElectronics

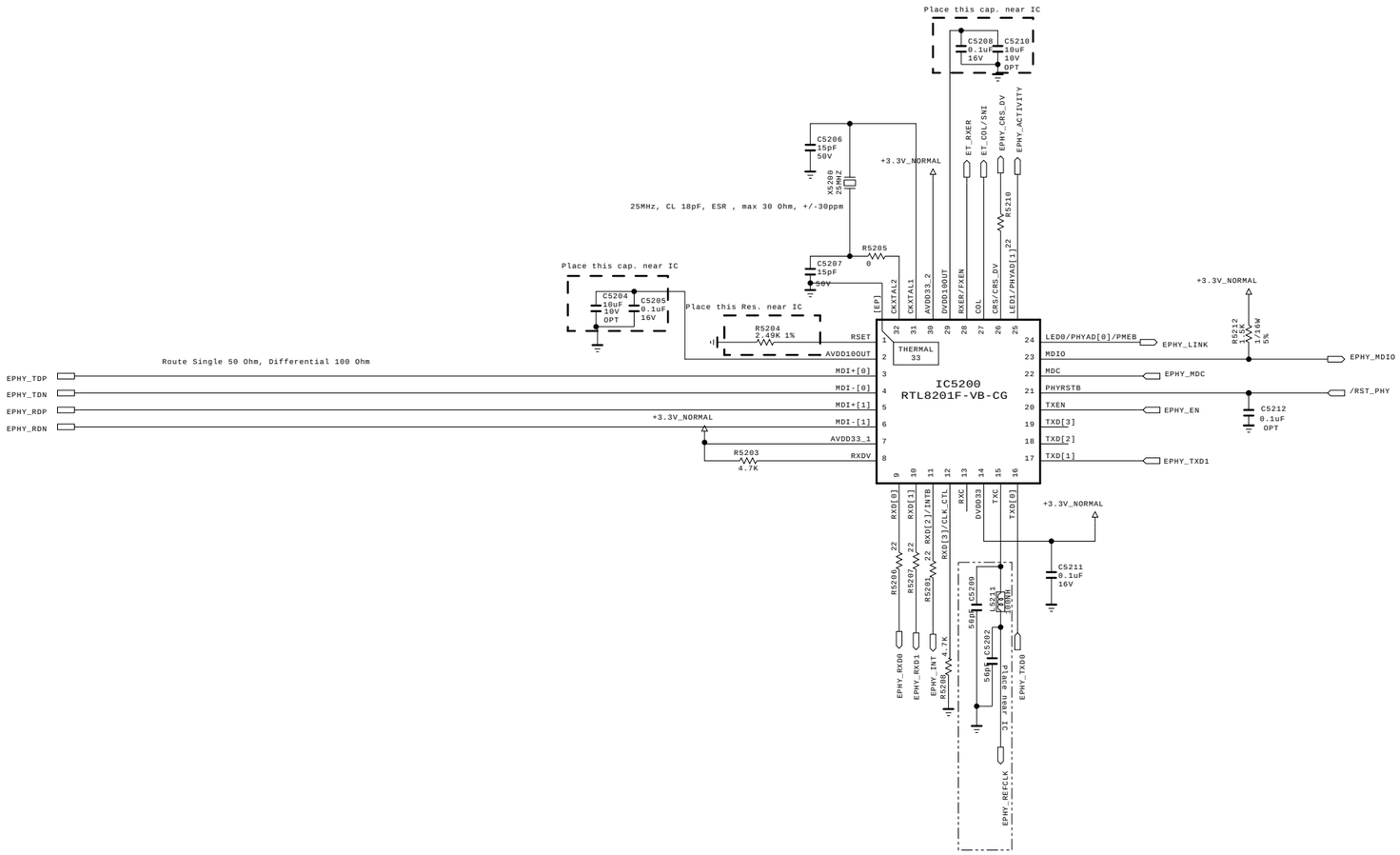
LG ELECTRONICS

MODEL	LAN_VERTICAL	DATE	2011.12.09
BLOCK		SHEET	50

Ethernet Block







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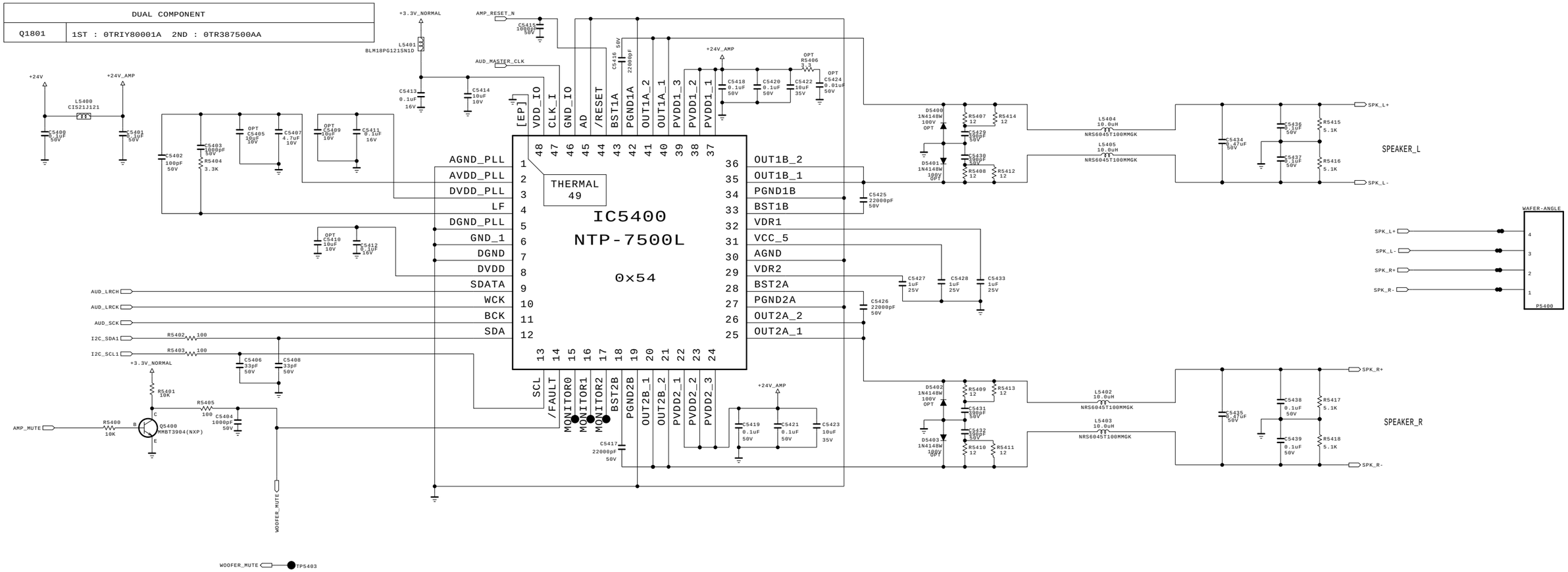
SECRET
LGElectronics

LG ELECTRONICS

MODEL	LG1152 A0	DATE	
BLOCK	ETHERNET	SHEET	14 / 50

DUAL COMPONENT	
Q1801	1ST : 0TRIY80001A 2ND : 0TR387500AA



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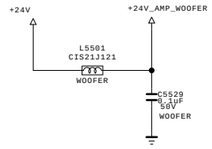
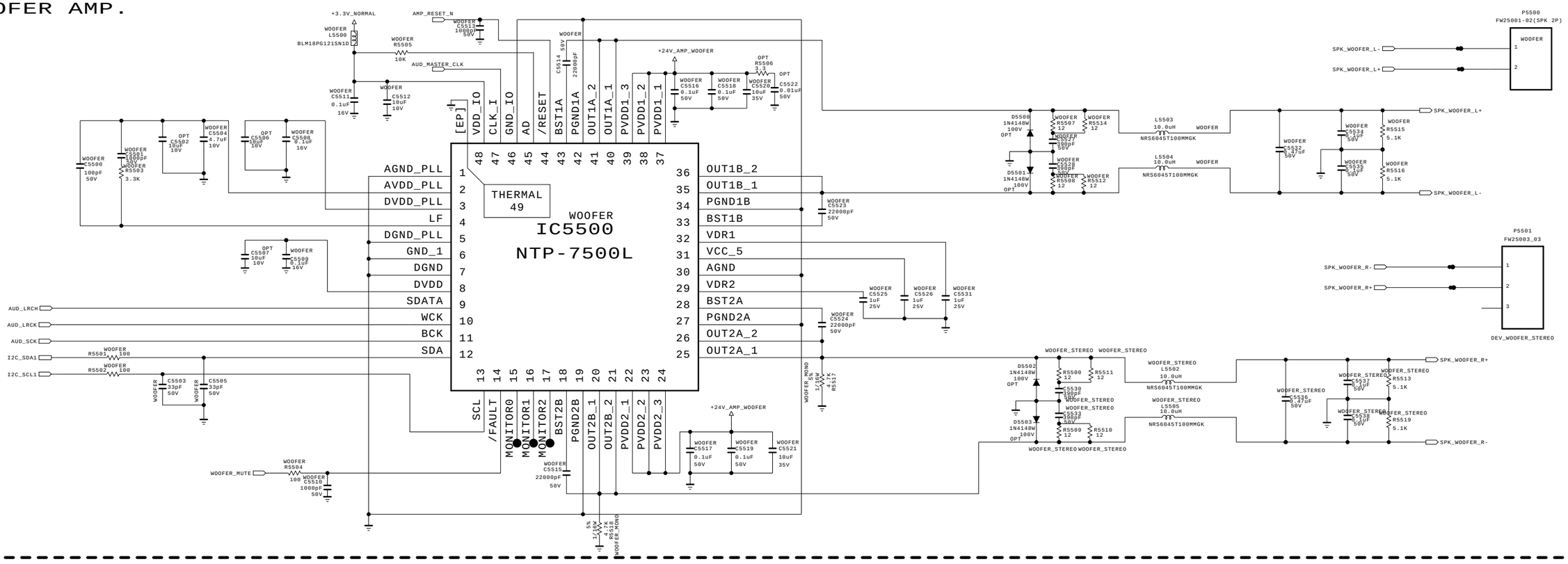
SECRET
LGElectronics

LG ELECTRONICS

MODEL	AMP_NEO	DATE	2011.11.21
BLOCK		SHEET	54



WOOFER AMP.



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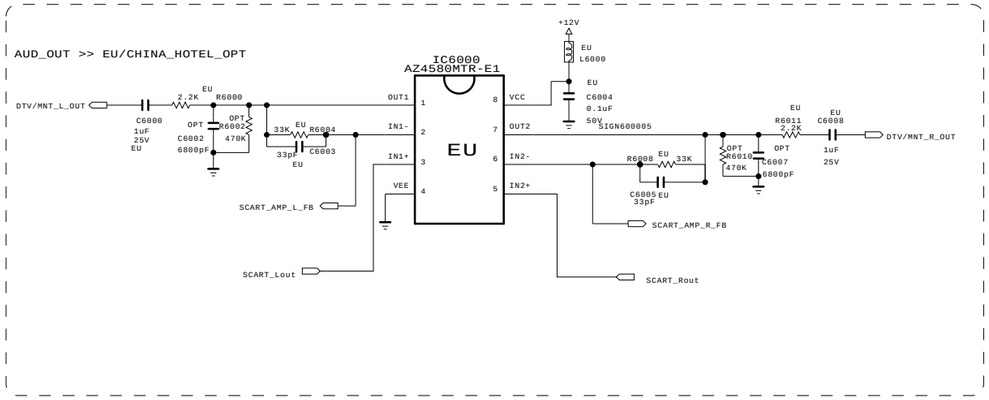
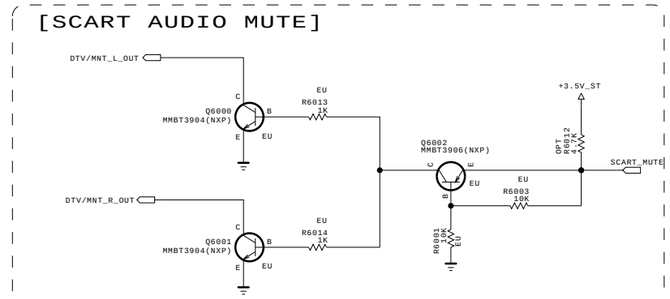
SECRET
LGElectronics

LG ELECTRONICS

MODEL		DATE	
BLOCK		SHEET	/





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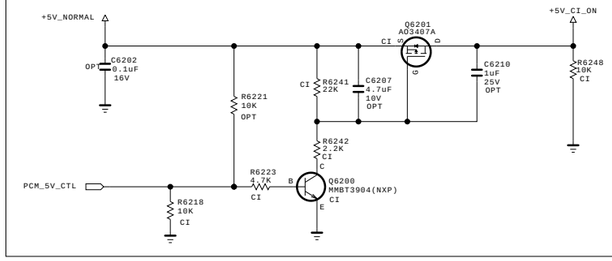
SECRET
LGElectronics

LG ELECTRONICS

MODEL	SCART AUDIO AMP	DATE	2011.11.21
BLOCK		SHEET	60

CI POWER ENABLE CONTROL



Option FOR MTK

C6210-*1
1uF
25V
CI_MTK

Option FOR LG1152

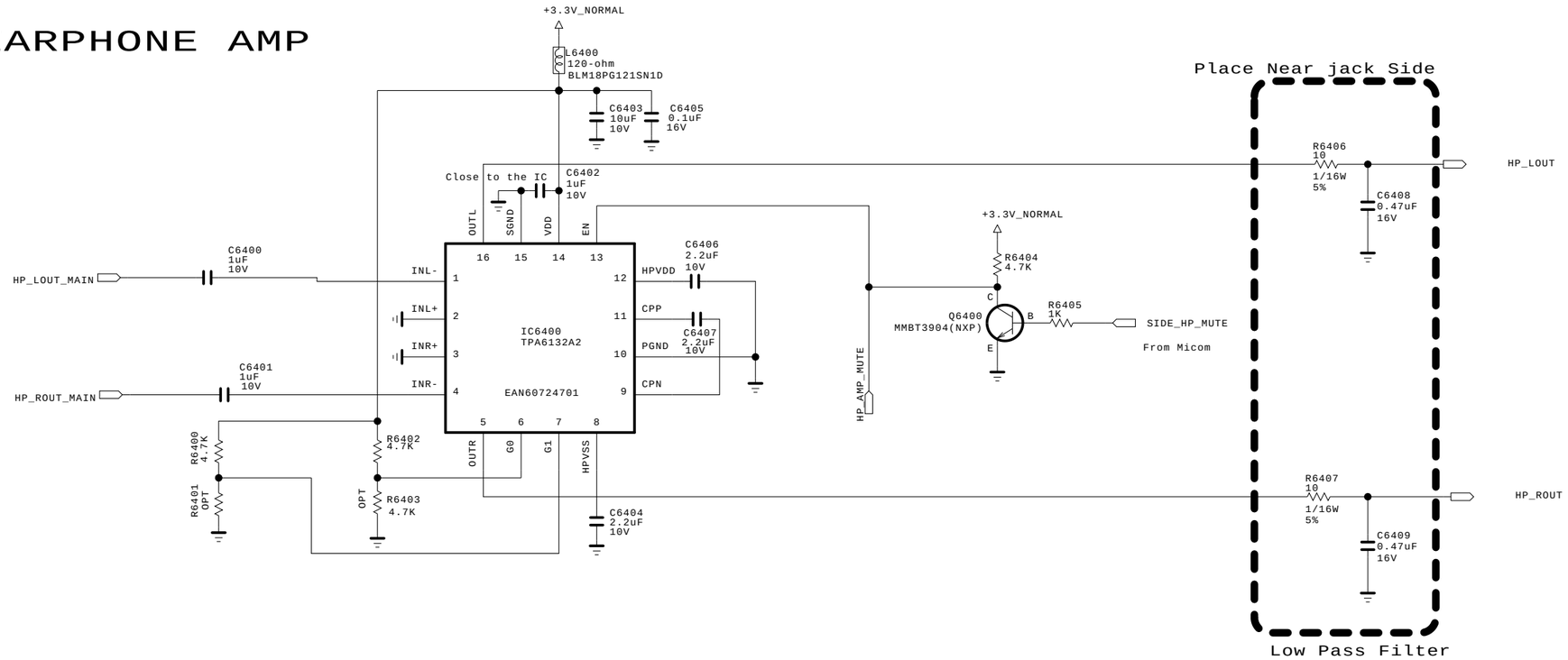
THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET
LGElectronics

LG ELECTRONICS

MODEL	CI SLOT	DATE	2011.10.31
BLOCK		SHEET	62

EARPHONE AMP



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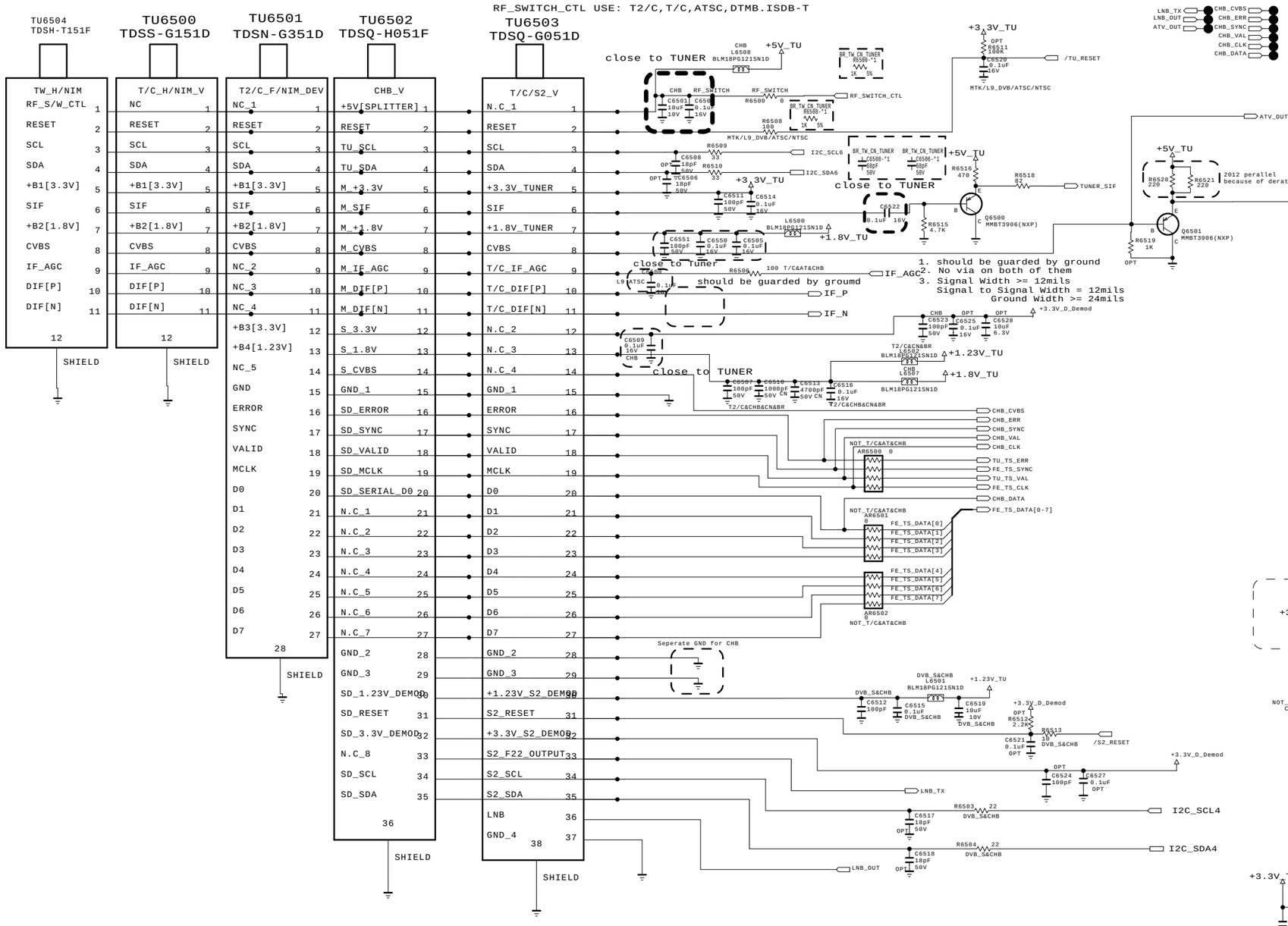
SECRET

LGElectronics

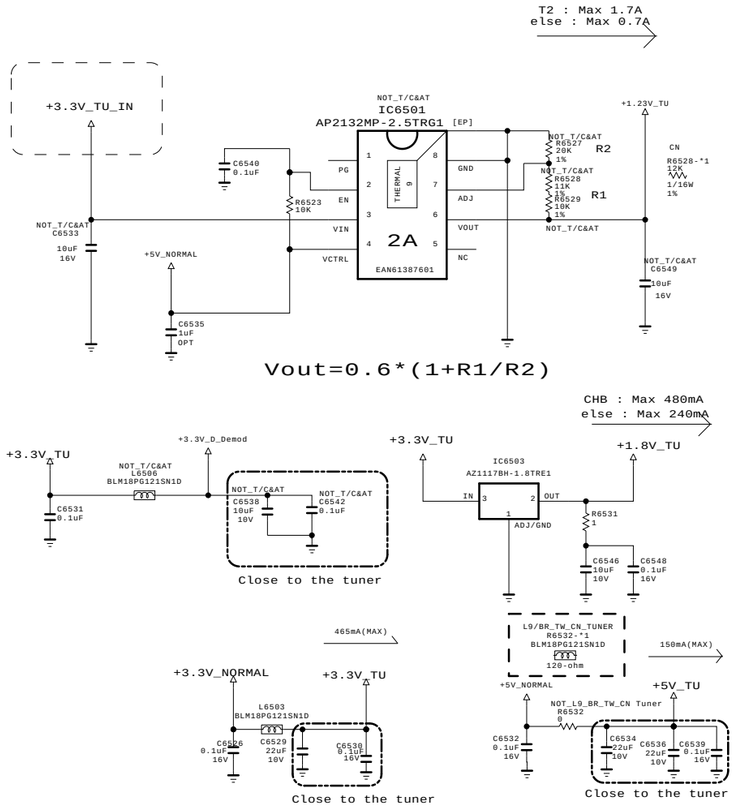
LG ELECTRONICS

MODEL	HEADPHONE AMP	DATE	2011.06.29
BLOCK		SHEET	61

T/C/S & H/NIM & T2/C TUNER(EU & CHINA)



TW_H/NIM	T/C/S2	T2/C_F/NIM	T2/C/S2	CHB	AT_H/NIM	CN	BR
T/C&AT&CHB	DVB_S	NOT_T/C&AT	DVB_S	CHB	T/C&AT&CHB	CN	
NOT_DVB_S	DVB_S&CHB	T2/C	DVB_S&CHB	DVB_S&CHB	NOT_DVB_S	NOT_T/C&AT	
Not_L9_T2/C/S	NOT_T/C&AT	T2/C&CN	NOT_T/C&AT	NOT_T/C&AT	Not_L9_T2/C/S	RF_SWITCH	
	T/C&AT&CHB	T2/C&CHB&CN	T2/C	T/C&AT&CHB		NOT_T/C&AT&CHB	
	NOT_T/C&AT&CHB	NOT_T/C&AT&CHB	T2/C&CN	T2/C&CHB&CN		NOT_DVB_S	
	Not_L9_T2/C/S	NOT_DVB_S	T2/C&CHB&CN	H/NIM&CHB		Not_L9_T2/C/S	
		Not_L9_T2/C/S	NOT_T/C&AT&CHB	Not_L9_T2/C/S			
			L9_T2/C/S				



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SECRET
LGElectronics

LG ELECTRONICS

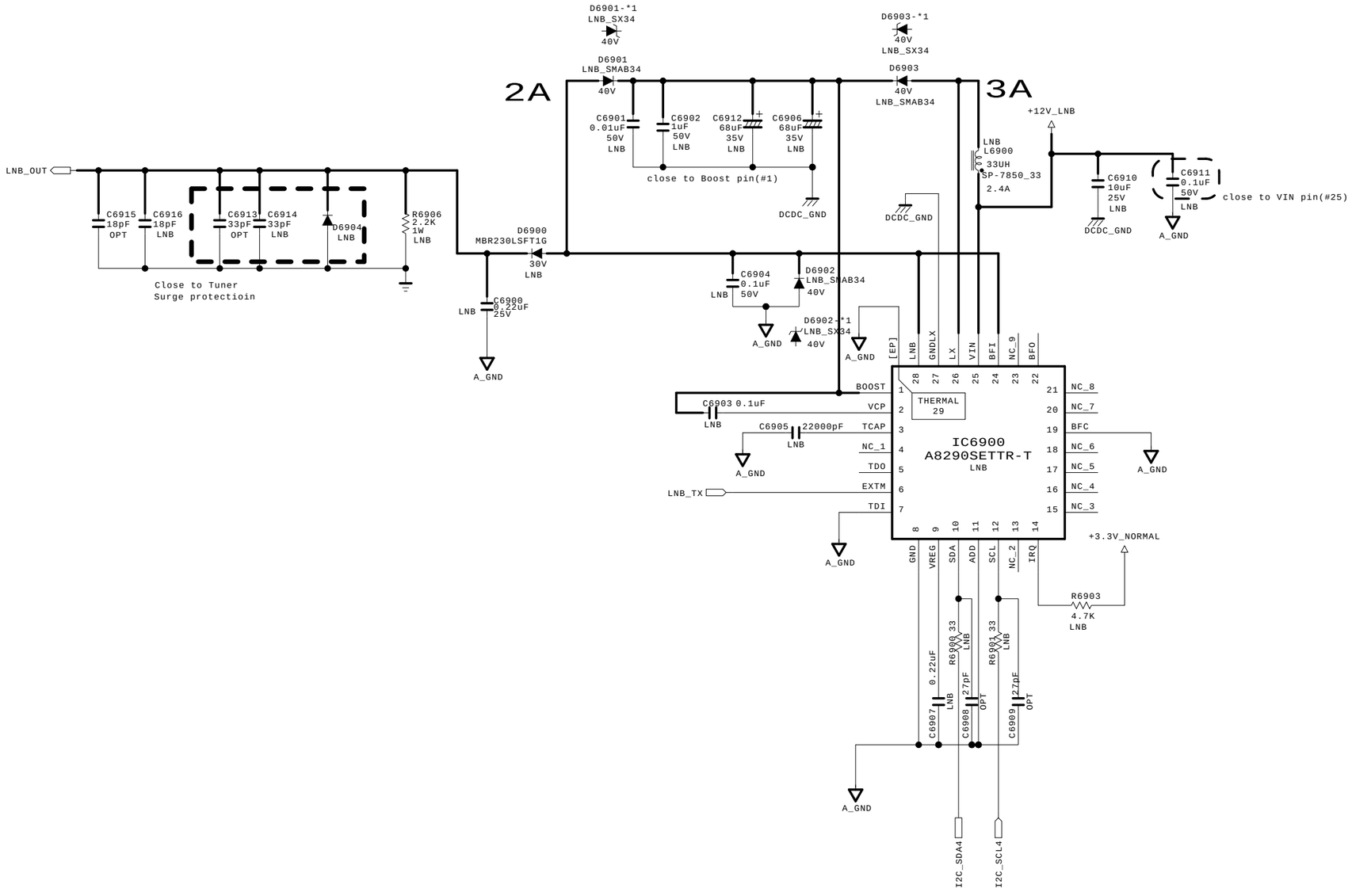
MODEL	TUNER	DATE	2011.11.21
BLOCK		SHEET	65

DVB-S2 LNB Part Allegro

(Option:LNB)

DCDC_GND and A_GND are connected
DCDC_GND and A_GND are connected in pin#27
PCB_GND and A_GND are connected

Input trace widths should be sized to conduct at least 3A
Ouput trace widths should be sized to conduct at least 2A



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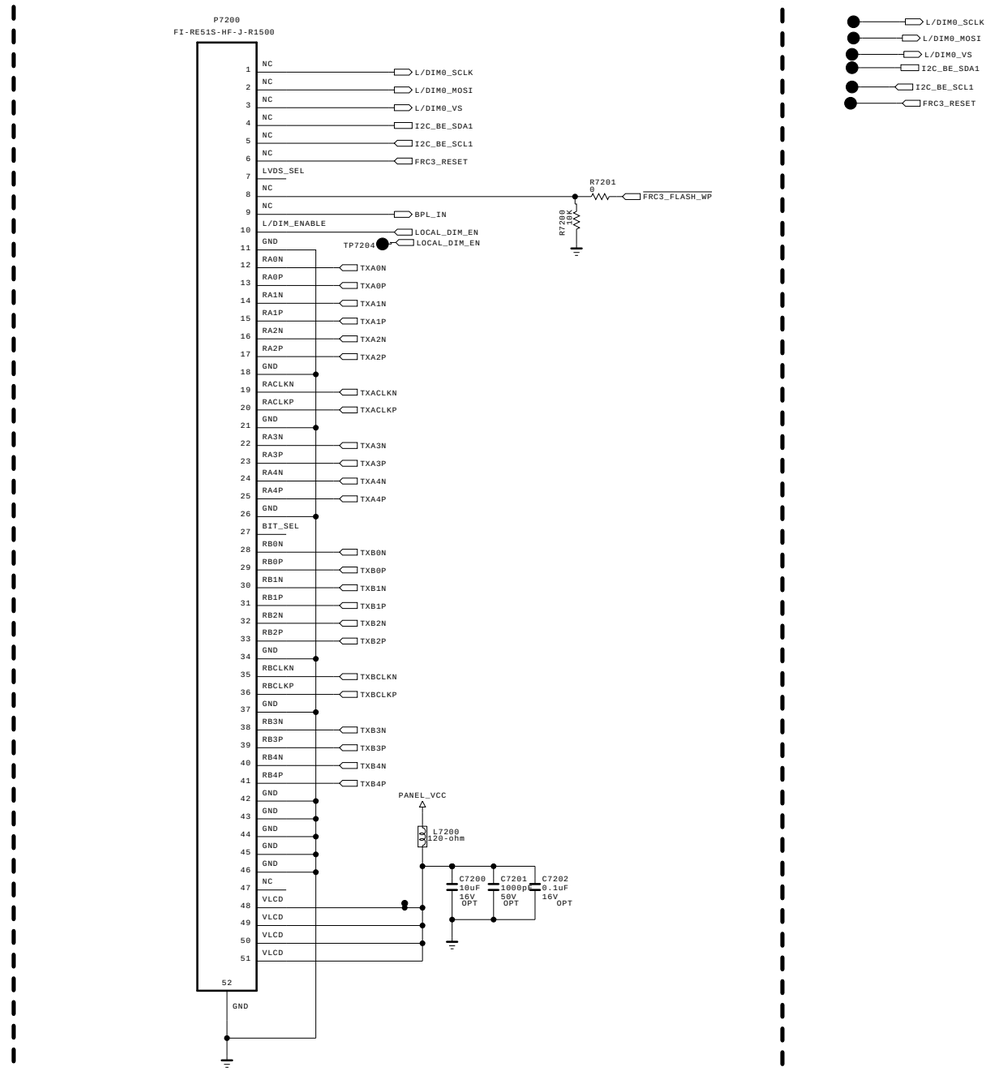
SECRET

LGElectronics

LG ELECTRONICS

MODEL	LNB	DATE	2011.11.21
BLOCK		SHEET	69

[51Pin LVDS Connector]
(For FHD FRC3 HS_LVDS)



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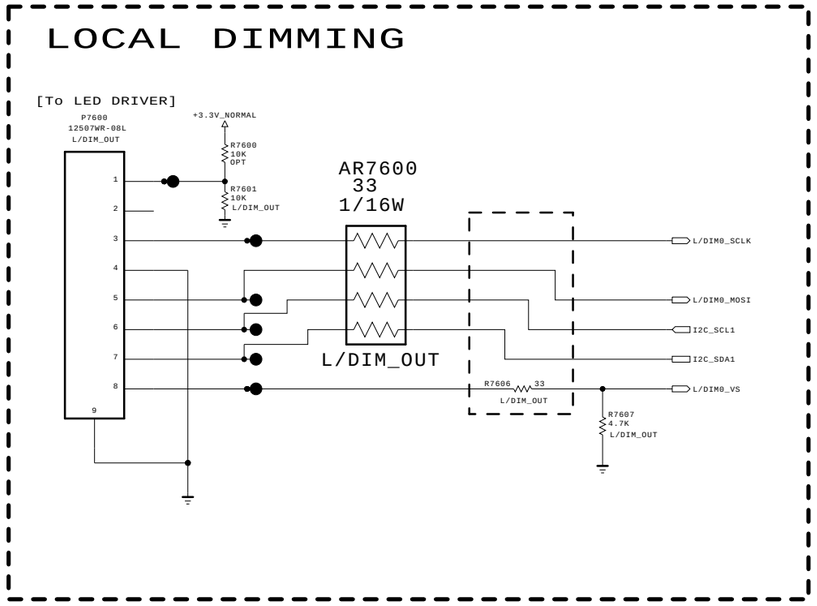
SECRET
LGElectronics

LG ELECTRONICS

MODEL	LG1152 A0	DATE	
BLOCK	Interface block	SHEET	72 / 100

LOCAL DIMMING

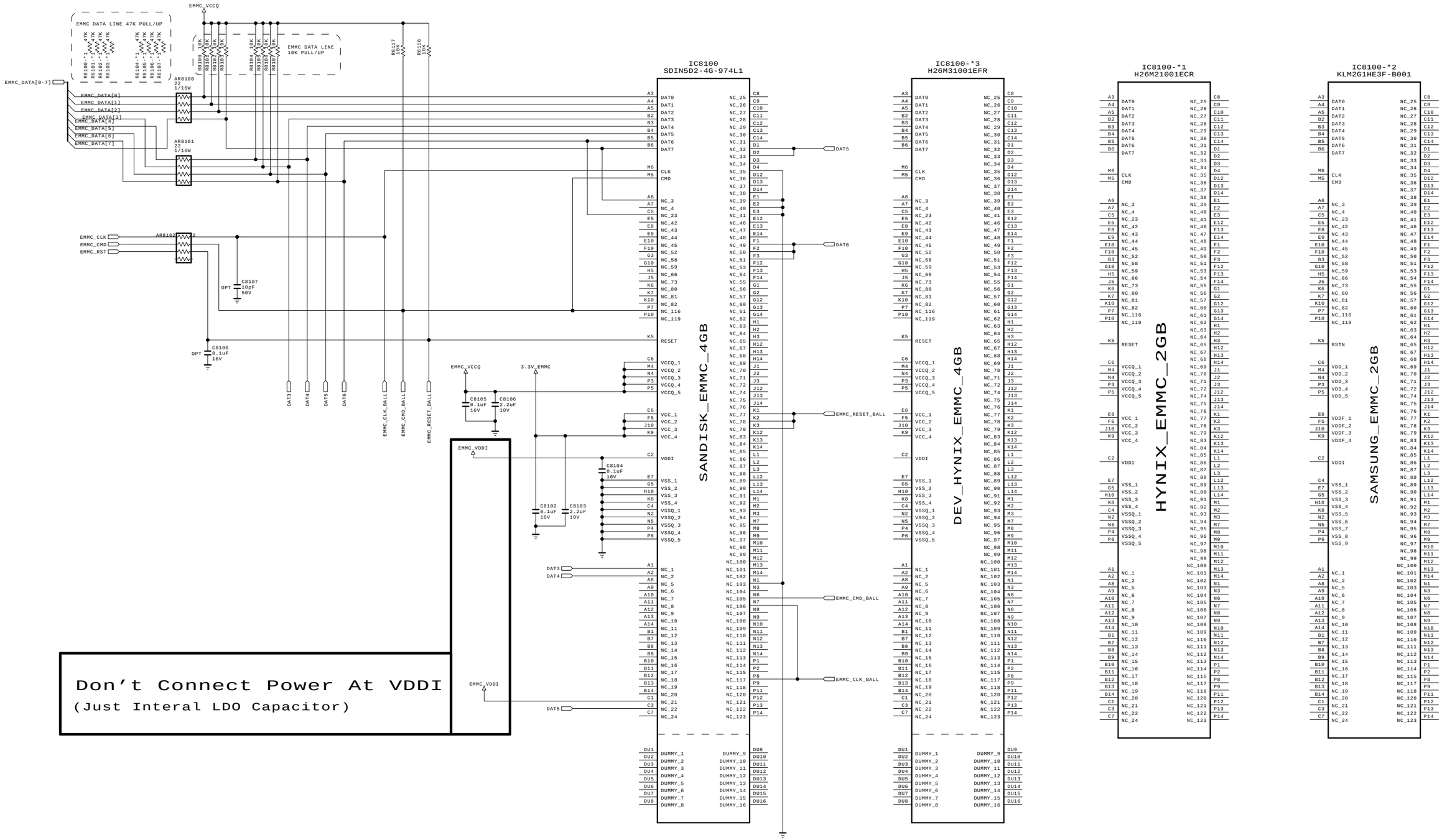


SECRET
LGElectronics

LG ELECTRONICS

MODEL	LOCAL DIMMING	DATE	2011.12.13
BLOCK		SHEET	76

eMMC I/F



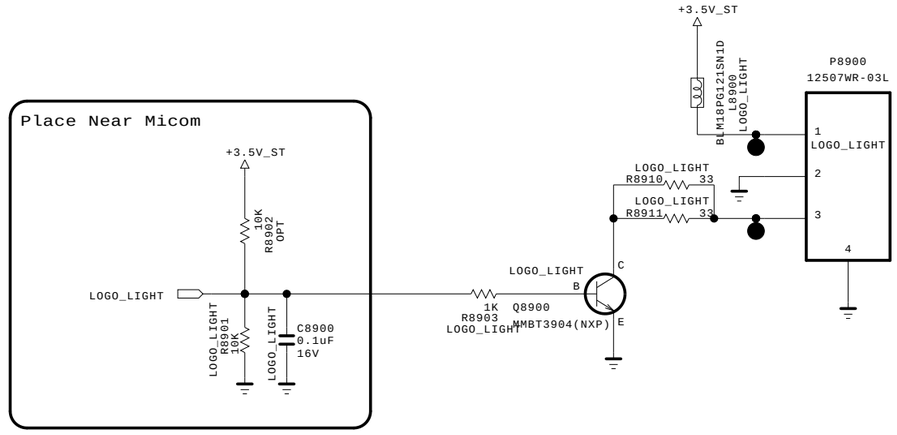
Don’t Connect Power At VDDI
(Just Interal LDO Capacitor)

THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET
LGElectronics

LG ELECTRONICS

MODEL	eMMC	DATE	11.09.29
BLOCK		SHEET	81



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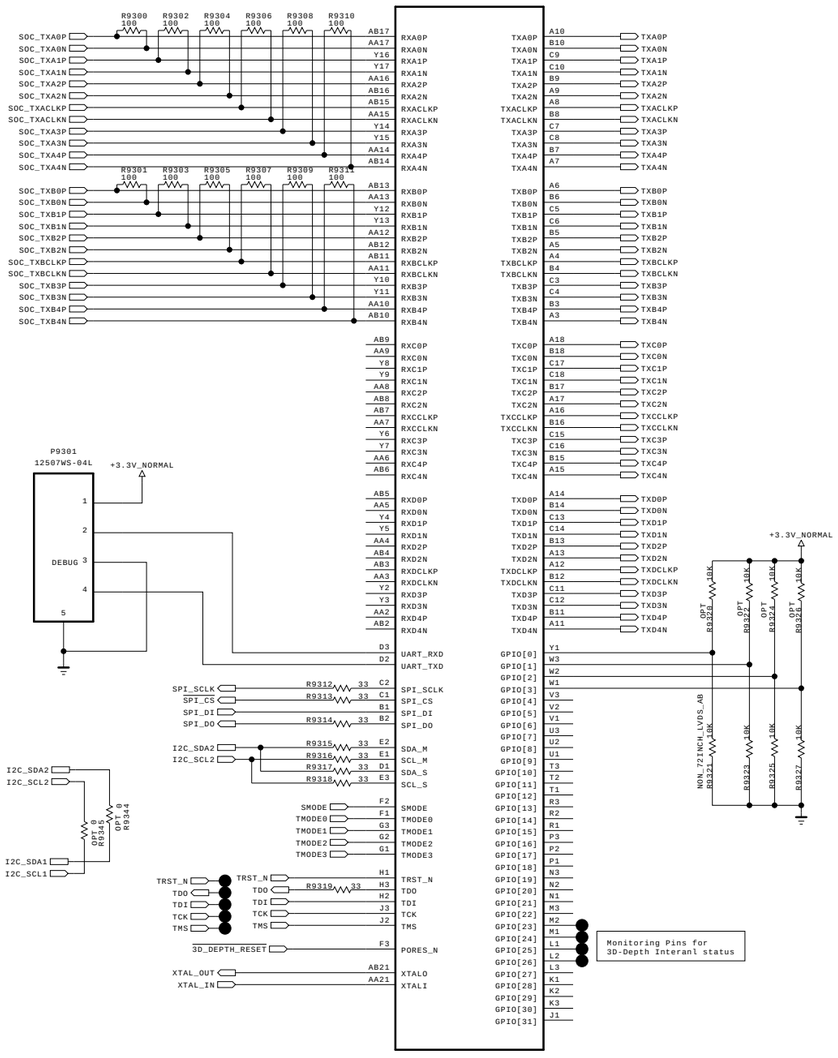
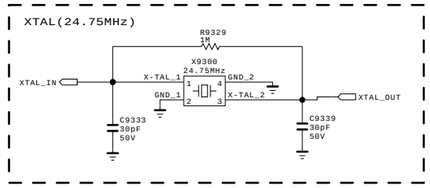
SECRET

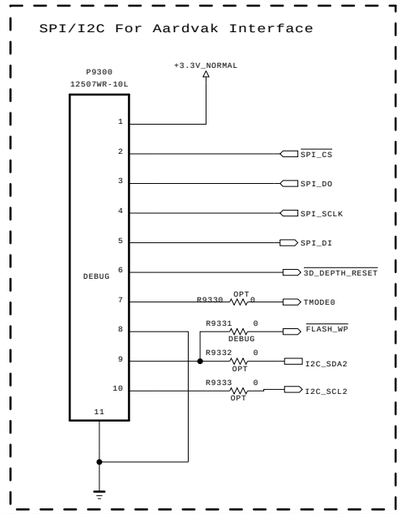
LGElectronics

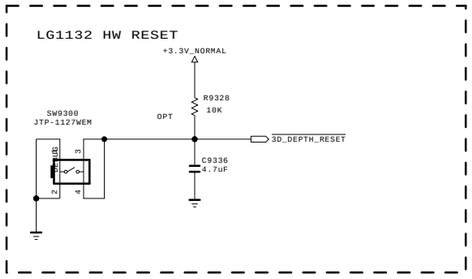
LG ELECTRONICS

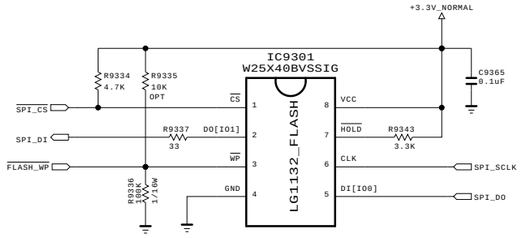
MODEL		DATE	
BLOCK		SHEET	/

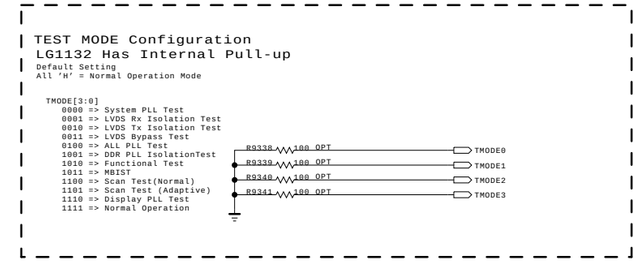


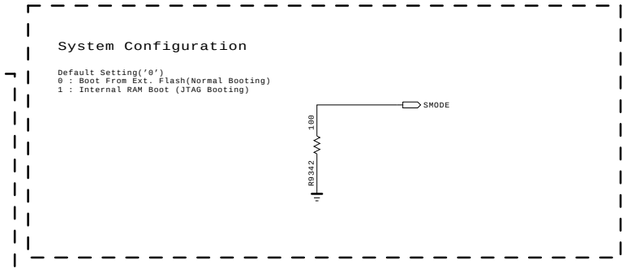


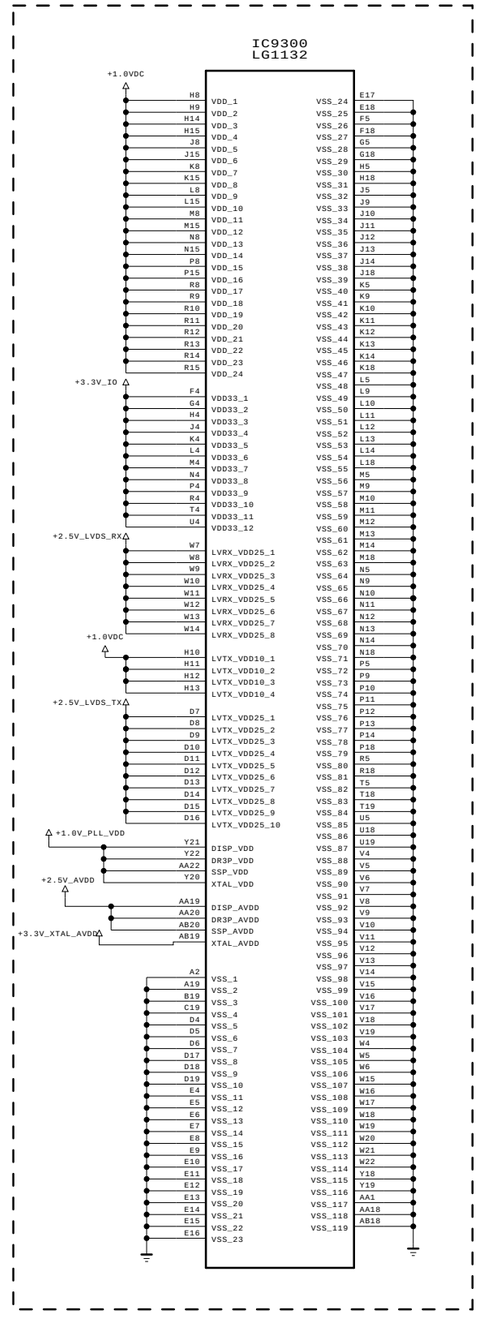


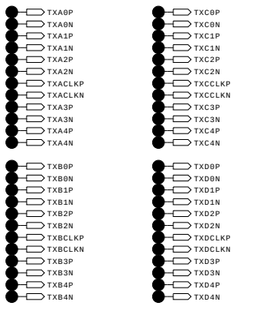


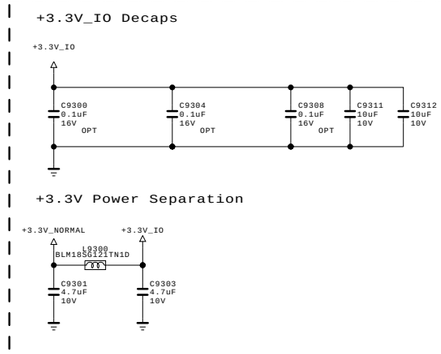


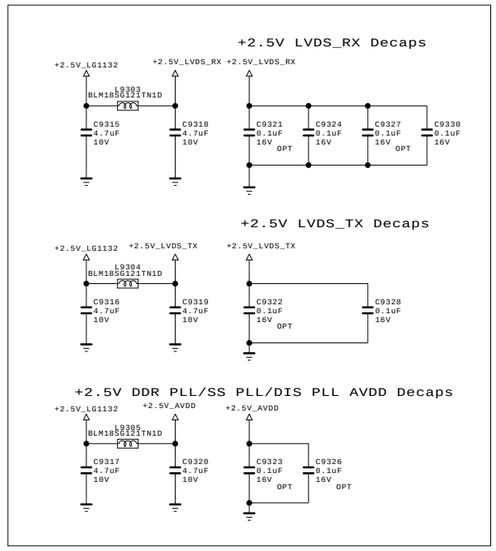


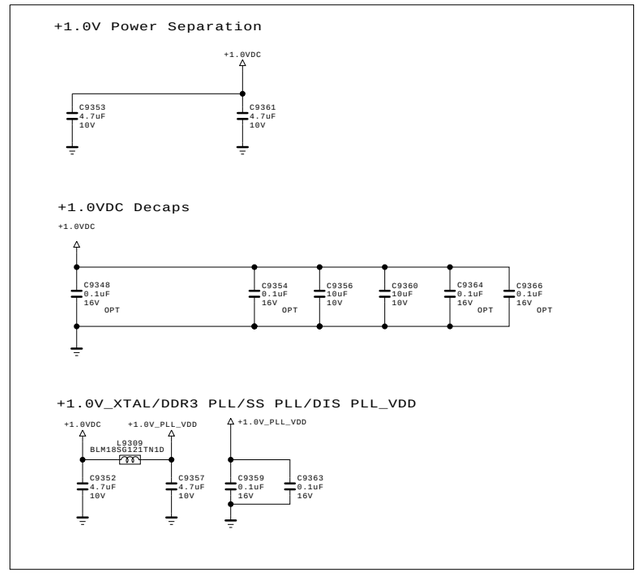


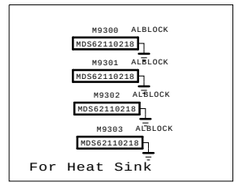










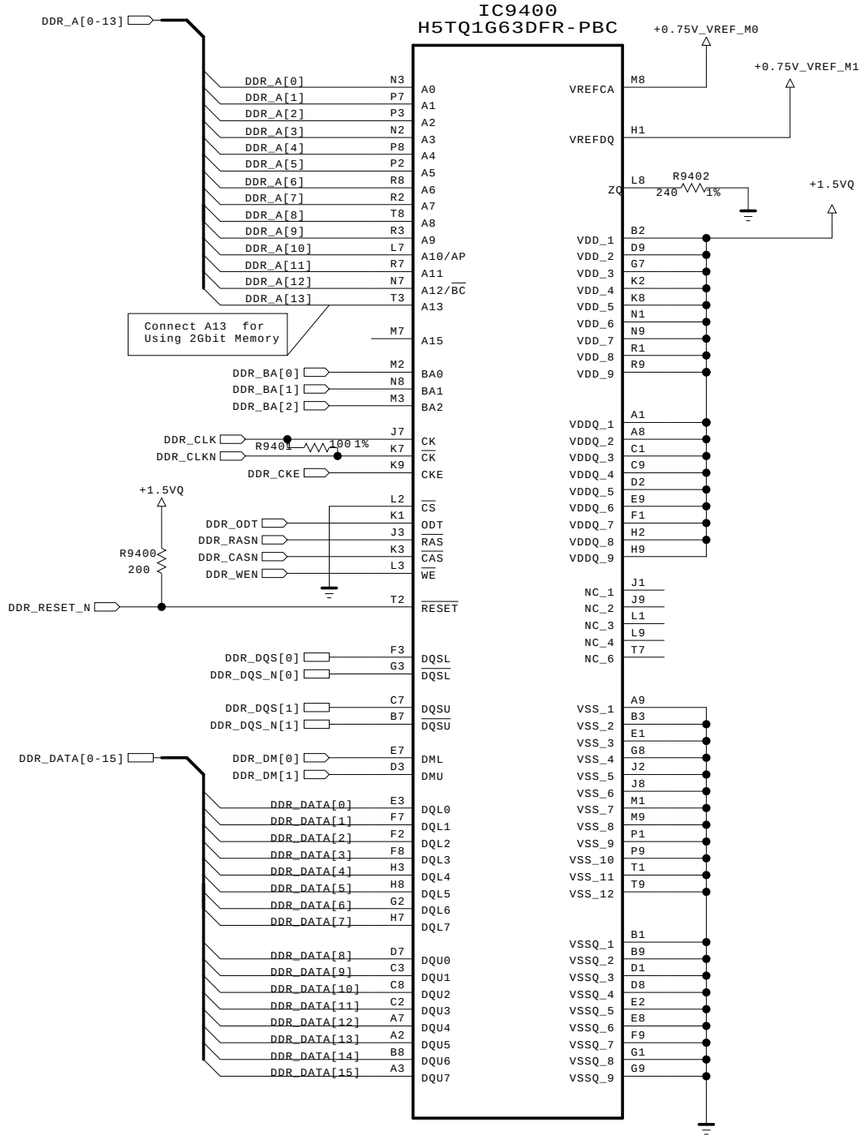


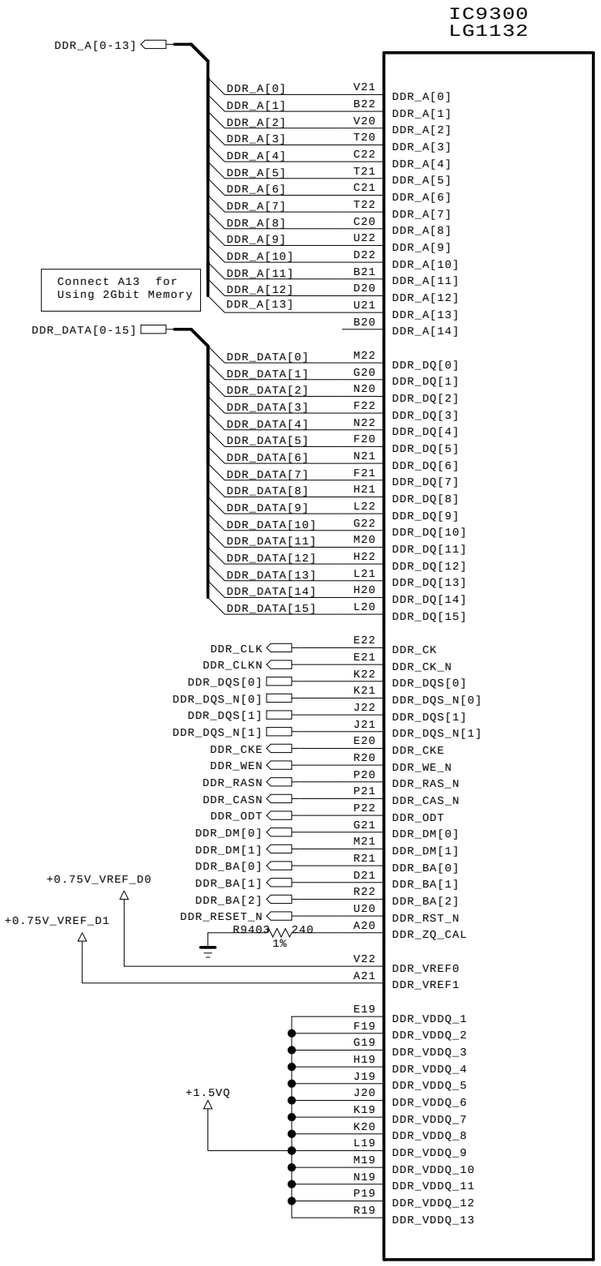
THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET
LGElectronics

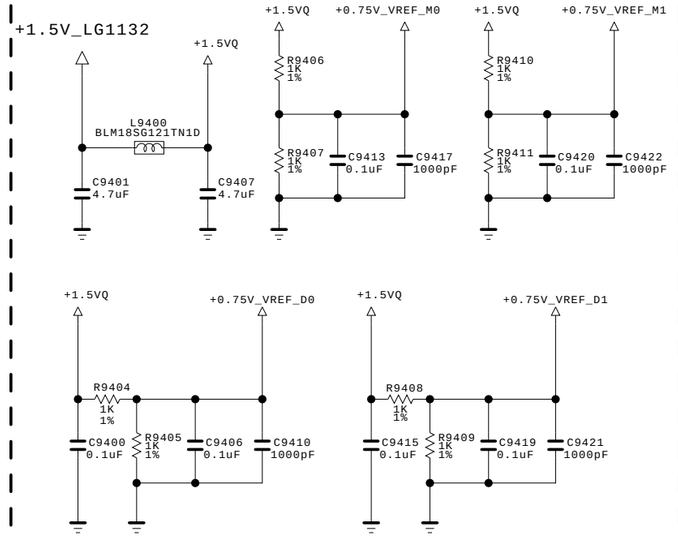
LG ELECTRONICS

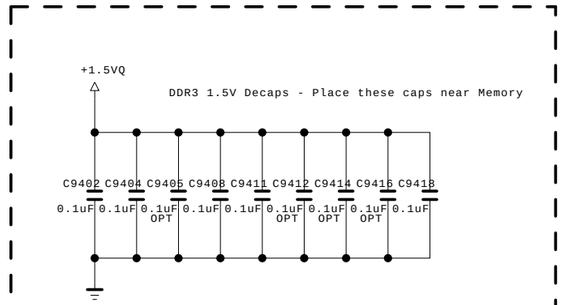
MODEL	LG1152 B0	DATE	2011. 11. 28
BLOCK	3D Depth	SHEET	/

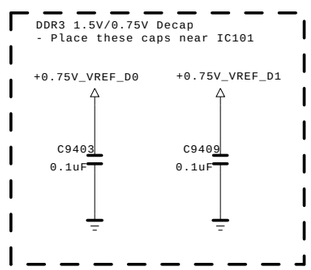




DDR0 PHY VREF







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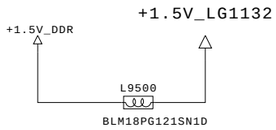
SECRET

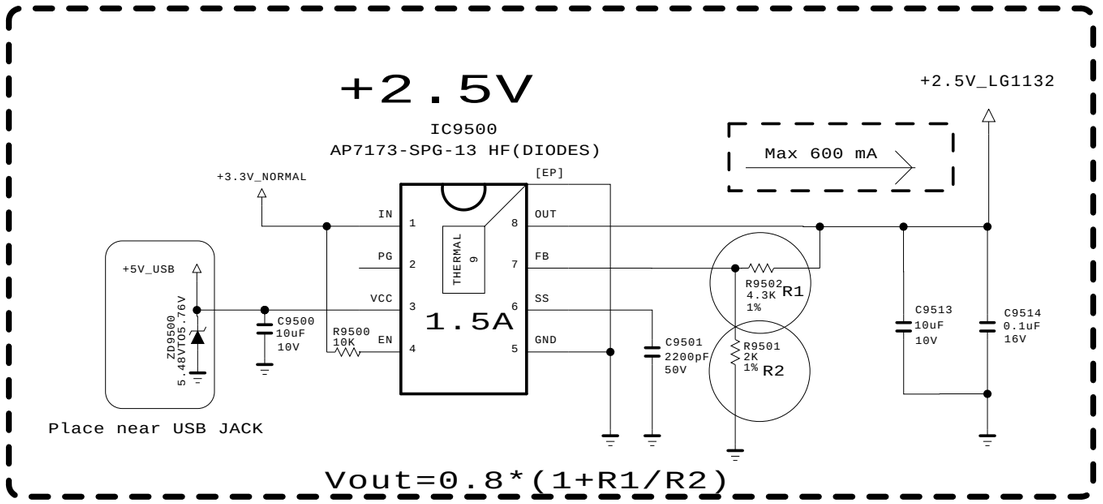
LGElectronics

LG ELECTRONICS

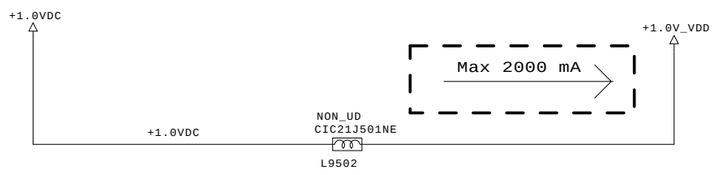
MODEL	LG1132 DDR3	DATE	2011. 06 .28
BLOCK	LG1132 DDR3	SHEET	/



3D-Depth Analog for 2.5V



LG1152 for 1.0V



**NON UD Model

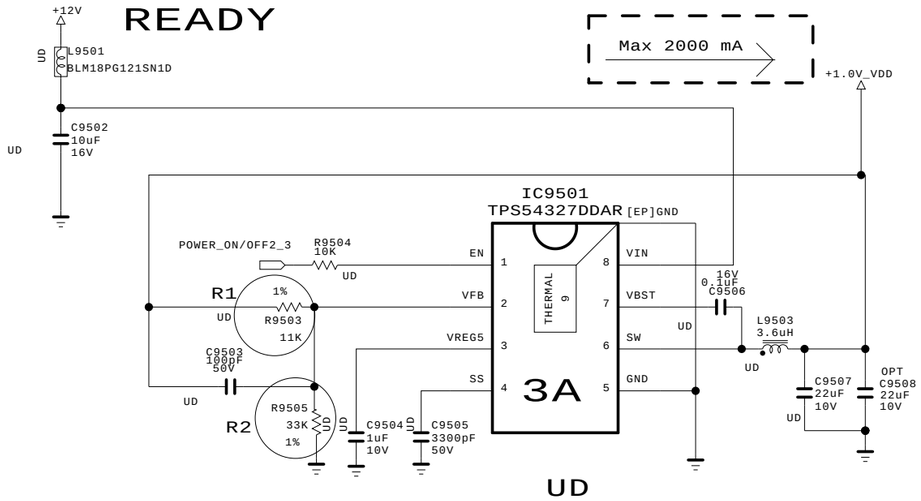
LG1132 DDR = 668Mhz
LG1152 1.0V ==> IC2306
LG1132 1.0V ==> IC2306

**UD Model

LG1132 DDR = 792Mhz
LG1152 1.0V ==> IC2501
LG1132 1.1V ==> IC2306

L9 CORE for 1.0V
(UD Model only / LG1132 DDR=792Mh)

READY



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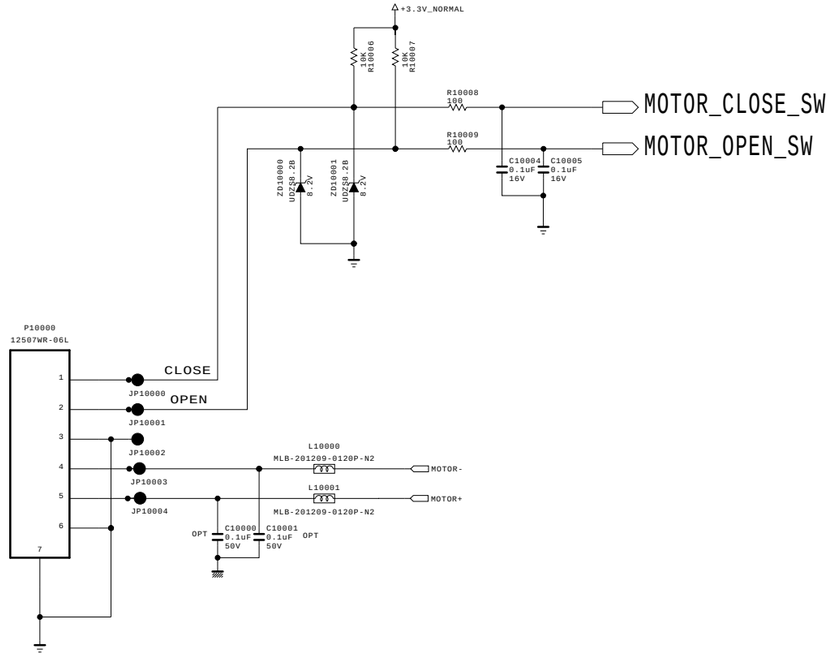
SECRET

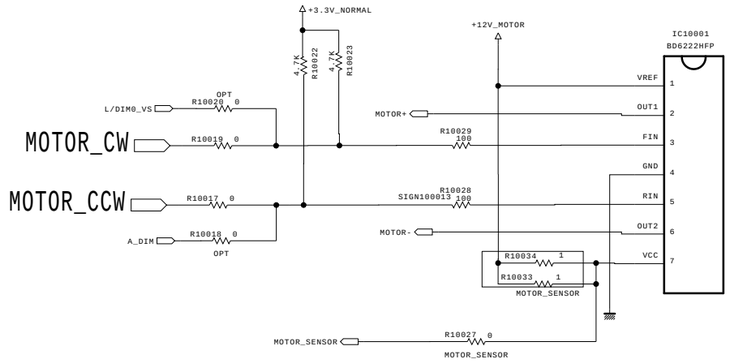
LGElectronics

LG ELECTRONICS

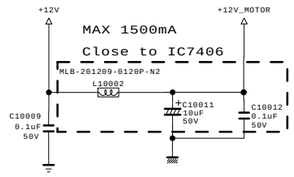
MODEL	LG1132 Power	DATE	2011. 06. 28
BLOCK	LG1132 POWER	SHEET	/

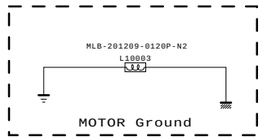
LGE Internal Use Only

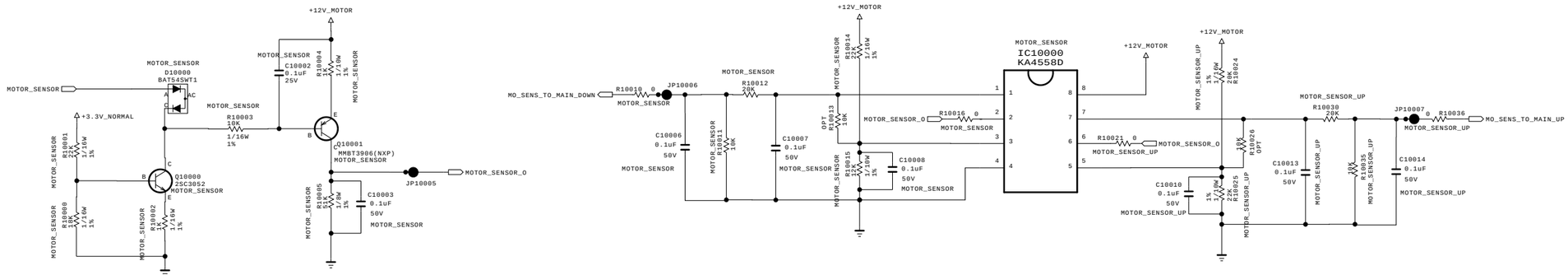




MOTOR DRIVER







MOTOR SENSOR OPTION

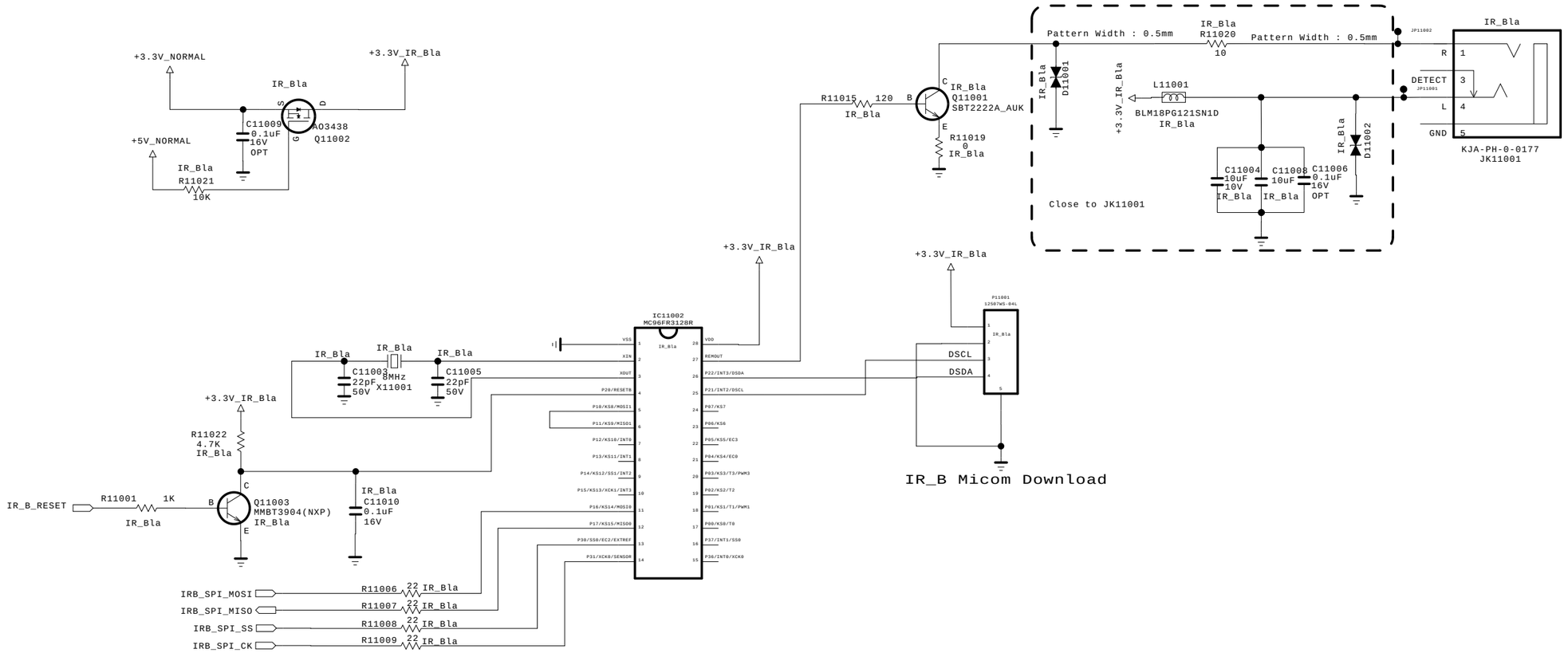
THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET
LGElectronics

LG ELECTRONICS

MODEL	GP4	DATE	2011.07.01
BLOCK	MOTOR CONTROL	SHEET	/

IR BLASTER



THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET

LGElectronics

LG ELECTRONICS

MODEL	LG1152 A1	DATE	2011. 06. 02
BLOCK	IR Blaster/Boost	SHEET	94


LG
Life's Good

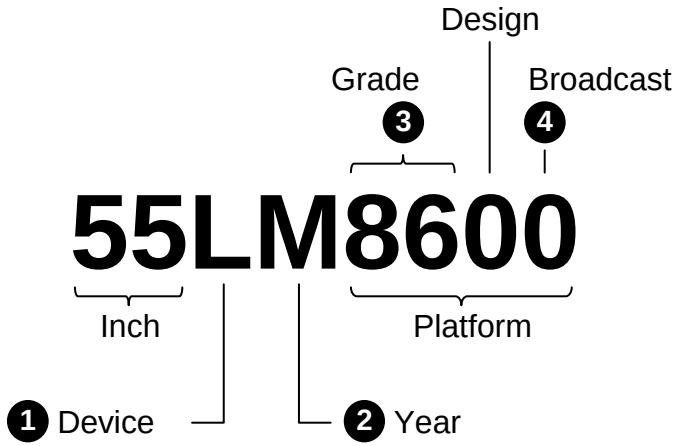
2012 LED/LCD TV
Engineering guide

Applicable Model

High-end

72LM9500-TA
xxLM9600-TA
xxLM8600-TA

1. Model naming and Tool option



1 Device	**L : LED** **C : CCFL** **E : OLED** **P : PDP**
2 Year	**'12 : M(3D), S(2D)** '11 : W(3D), V(2D), K(CCFL) '10 : E(LED), D(CCFL) '09 : H
3 Grade ('12year)	**High-end : 96 / 95 /86** **Mid-end : 76 / 67 / 66 / 64 / 62** **Low-end : 46 / 36 / 34**
4 Broadcast	**Next Page**

1. Model naming and Tool option

	EU/CIS	KR	US	SCA	Asia	MEA	Japan
0 (zero)	DVB-T/C	ATSC	ATSC	DVB-T	**DVB-T**	**DVB-T**	ISDB-T
T	DVB-T2/C				**DVB-T2**	**DVB-T2**	
S	DVB-T/C/S2						
V	DVB-T2/C/S2						
C	DVB-T2/C2/S2						
B				ISDB-T	**ISDB-T**		
A				ATSC			

1. Model naming and Tool option

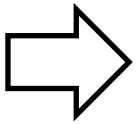
								Module Spec							무선		안경	
인치	구분	Tool	Model	Grade	Main Soc	Chassis Name	요청 출시	Maker	Name	M+S	Local Dimming	Modul Type	Hz	FHD /HD	Wi-Fi	Magic	Normal	Dual Play
55	EM9600	EM9600	55EM9600-TA	D4	L9	EB23E	8/4W	LGD	OLED			OLED	T120	FHD	B/I	B/I	B/I (F310 2box)	B/I (F310DP 1box)
72	LM9500	LZ9900	72LM9500-TA	C1	L9	LB23J	3/1W	LGD	LC720DUC-SDF1		O	IOL	T480	FHD	Ready	Ready	B/I (F310 2box)	B/I (F310DP 1box)
84	LM9600	LM9600	84LM9600-TA	D4	L9	LB23J	8/3W	LGD	84FPREdgeT240 FHD		O	Edge	T240	FHD	B/I	B/I (호주 :M4)	B/I (F310 2box)	B/I (F310DP 1box)
60	LM9600	LM9600	60LM9600-TA	D1	L9	LB23E	8/3W	LGD	60FPRPOLARIST 240FHD		O	POLARIS	T240	FHD	B/I	B/I (호주 :M4)	B/I (F310 2box)	B/I (F310DP 1box)
55	LM9600	LM9600	55LM9600-TA	E	L9	LB23E	2/1W	LGD	LC550DUT-SEF1		O	ALEF	T480	FHD	B/I	B/I (호주 :M4)	B/I (F310 2box)	B/I (F310DP 1box)
47	LM9600	LM9600	47LM9600-TA	D4 →E	L9	LB23E	2/1W	LGD	LC470DUT-SEF1		O	ALEF	T480	FHD	B/I	B/I (호주 :M4)	B/I (F310 2box)	B/I (F310DP 1box)
55	LM8600	LM8600	55LM8600-TA	C1	L9	LB23E	2/1W	LGD	LC550EUH-PEF1	O	O	SemiLCM	T240	FHD	B/I	B/I (호주 :M4)	B/I (F310 2box)	B/I (F310DP 1box)
47	LM8600	LM8600	47LM8600-TA	E	L9	LB23E	2/1W	LGD	LC470EUH-PEF1	O	O	SemiLCM	T240	FHD	B/I	B/I (호주 :M4)	B/I (F310 2box)	B/I (F310DP 1box)

2. New Feature : Tool option ,Country Group, Area Option – Country Group

- Country Group : 9 unit -> 3 unit(AJ,JA,IL)
- Country : Set in Factory -> Set by User
- Myanmar / Sri Lanka: New DTV country
- India / Thailand : Large corporation
- Algeria / Tunisia : Manage in Asia-Africa
- Israel : Separate by distribution

Asia-Africa in 2011

Country Group	Country
A-ASIA (XB)	Analog TV
AU	Australia, New Zealand
SG	Singapore
ID	Indonesia
MY	Malaysia
VN	Vietnam
IR	Iran
IL	Israel
ZA	South Africa



Asia-Africa in 2012

Country Group	Country	ATV/DTV
AJ (Asia)	Australia (Default)	DTV (DVB-T)
	New Zealand	DTV (DVB-T)
	Singapore	DTV (DVB-T)
	Vietnam	DTV (DVB-T)
	Indonesia	DTV (DVB-T)
	Malaysia	DTV (DVB-T)
	Myanmar	DTV (DVB-T)
	Sri Lanka	DTV (DVB-T)
	India	ATV (PAL-BG,DK,I,M)
	Thailand	ATV (PAL-BG,DK,I,M)
	"--"	ATV (PAL-BG,DK,I,M)
JA (MEA)	Analog TV (Default)	ATV (PAL-BG,DK,I,M)
	Digital TV	DTV (Basic:EU"--"Standard)
	South Africa	DTV (DVB-T)
	Iran	DTV (DVB-T)
	Algeria	DTV (DVB-T)
	Tunisia	DTV (DVB-T)
IL (Israel)	Israel	DTV (DVB-T)

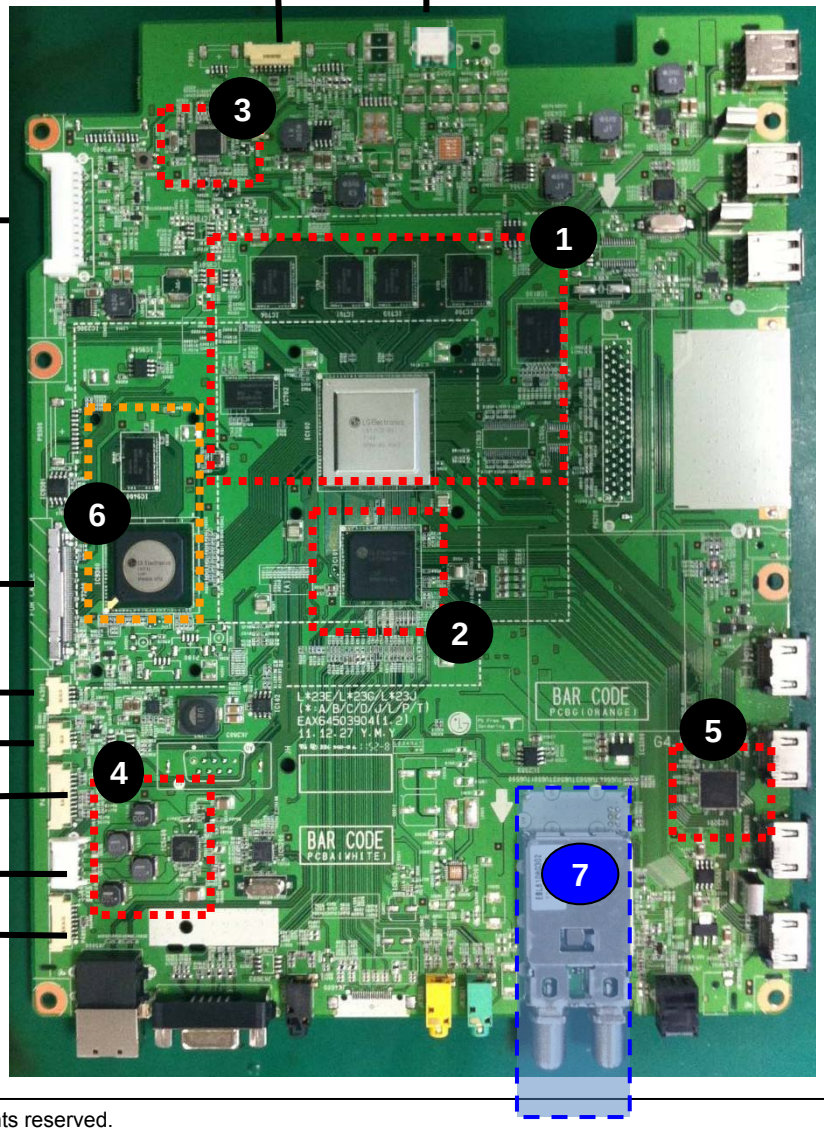
2. New Feature : Tool option ,Country Group, Area Option – Area option

Country Group	AJ					
MARKET	Myanmar	Australia New Zealand Singapore Malaysia	Indonesia	Vietnam	Thailand Sri Lanka	India
Area Option	257	263	262	16645	16647	18183

JA										IL
West Africa	Iraq (MQ_FARSI)	Iraq (MH,ME_ARABIC) Sudan Syria Libya	South Africa Kenya Mauritius	Kuwait Algeria Tunisia Israel (MT_SBITANY)	Nigeria	U.A.E Saudi Arabia	Egypt Jordan Lebanon	Iran	Pakistan	Israel (MF_H.Y.E)
257	385	353	259	355	260	357	359	391	16738	355

3. Main PCB Feature for High-end models

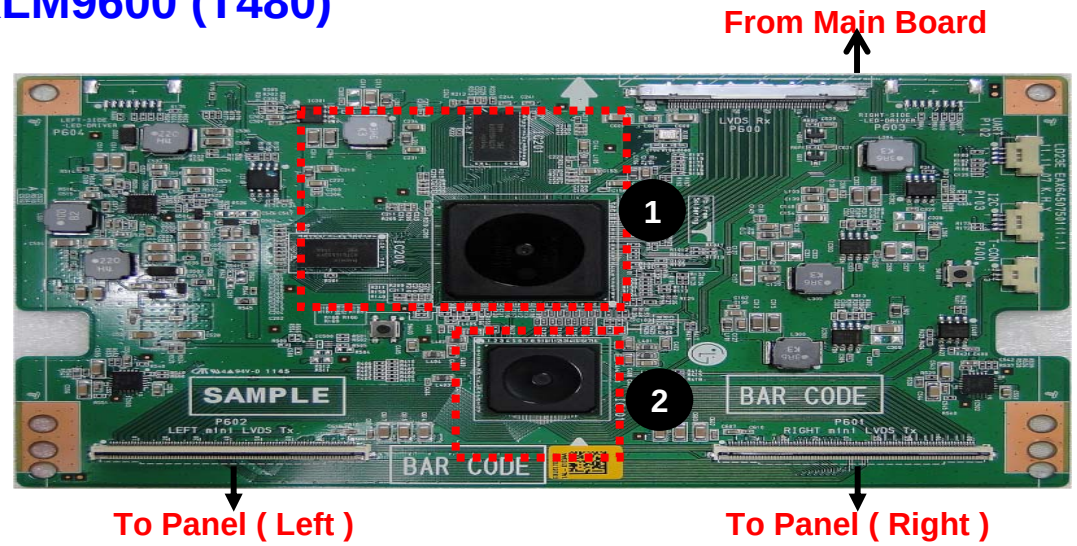
xxLM9600/8600



1. Main processor_Digital(LG1152D), DDR Memory, Flash Memory
2. Main processor_analog(LG1152A)
3. Micom for Key/IR sensing
4. Audio AMP (10W+10W)
5. HDMI switch (4:1)
6. 3D Depth Control IC, DDR Memory
7. Tuner (Picture can be different)

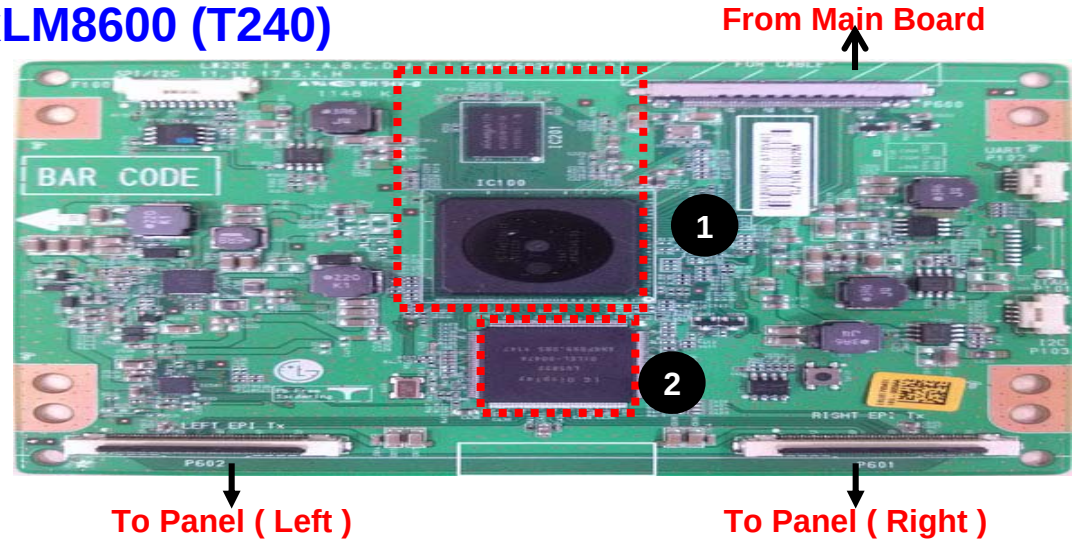
3. FRC PCB Feature for High-end models

xxLM9600 (T480)



1. FRC Processor(LG1122)
2. T-Con IC(LG5812)

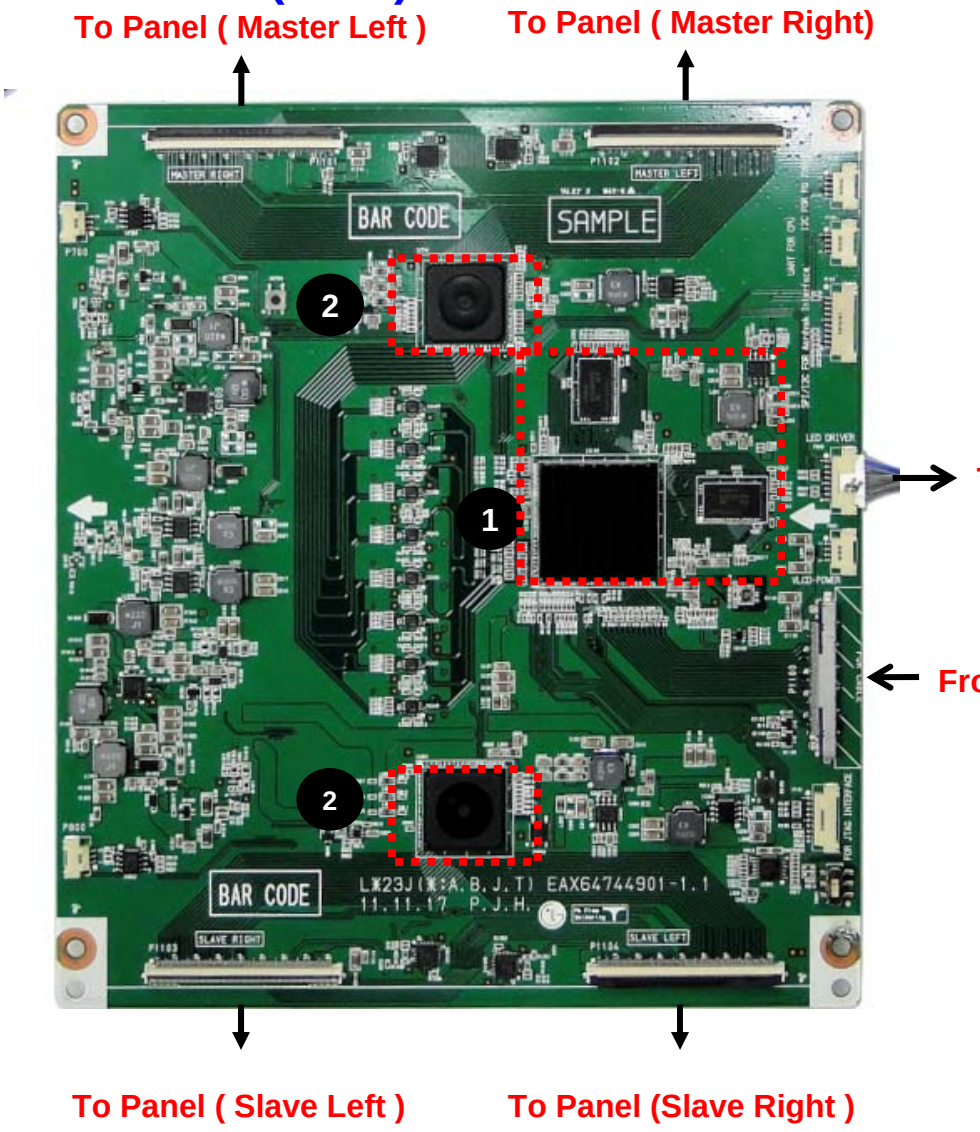
xxLM8600 (T240)



1. FRC Processor(LG1122)
2. T-Con IC(LG5822)

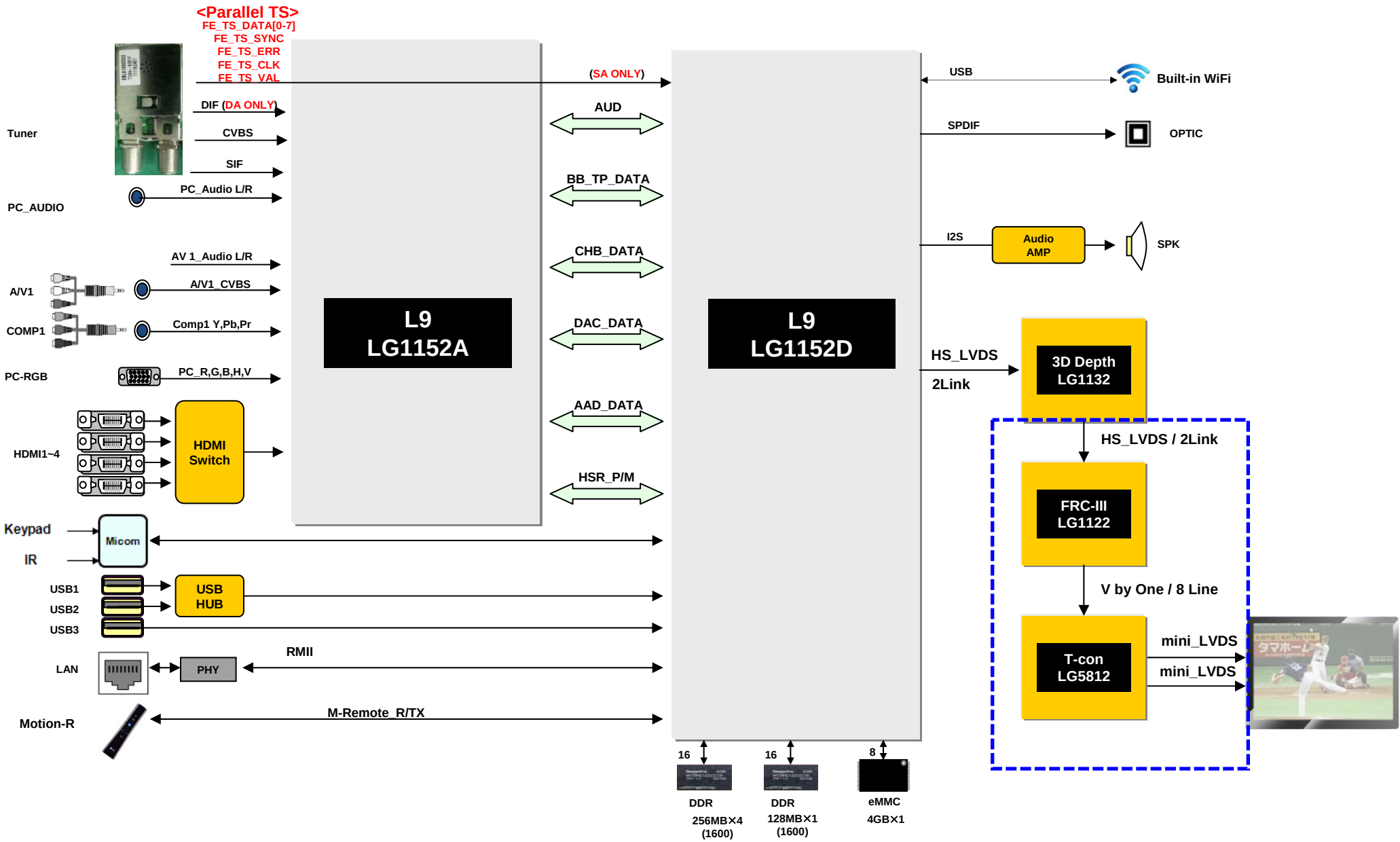
3. FRC PCB Feature for High-end models

72LM9500 (T480)



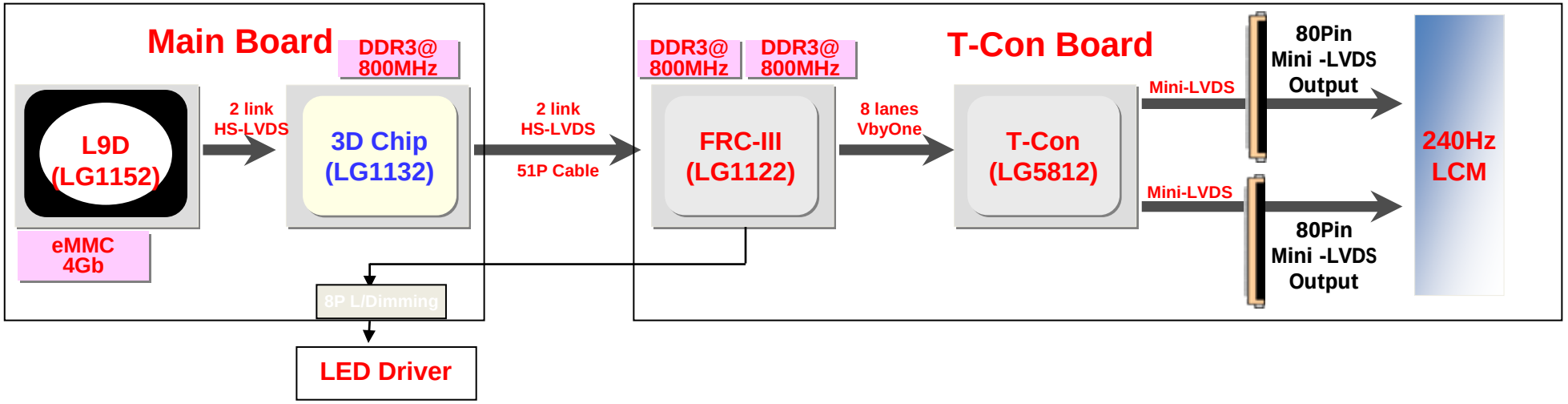
1. FRC Processor(LG1122)
2. T-Con IC(LG5812)

4. Block Diagram for High-end models(Main + BE)

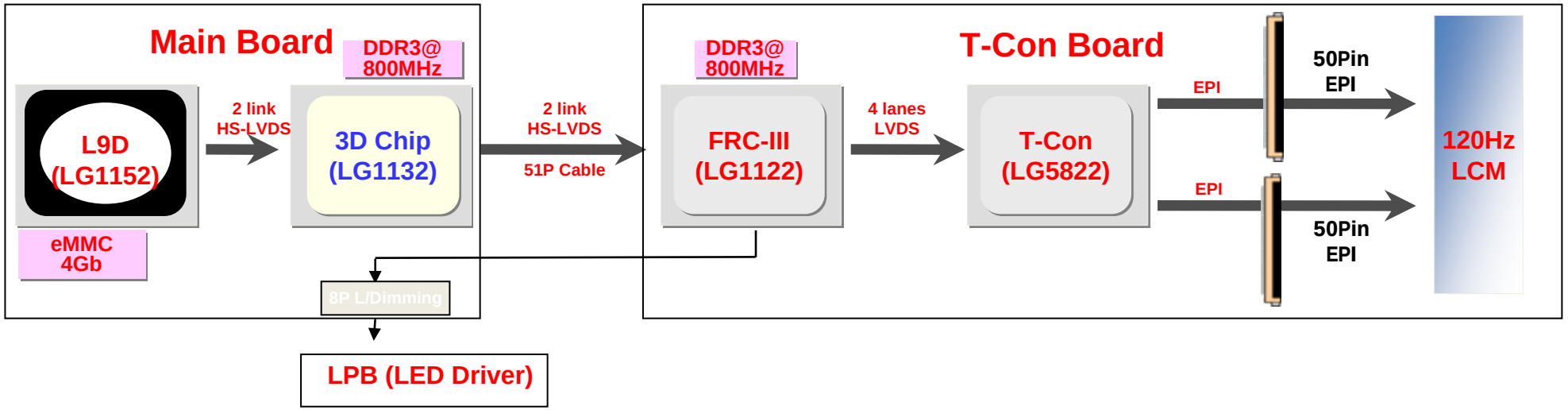


4. Block Diagram for High-end models(Back-end)

* FHD 240Hz, T480Hz (47/55LM9600)



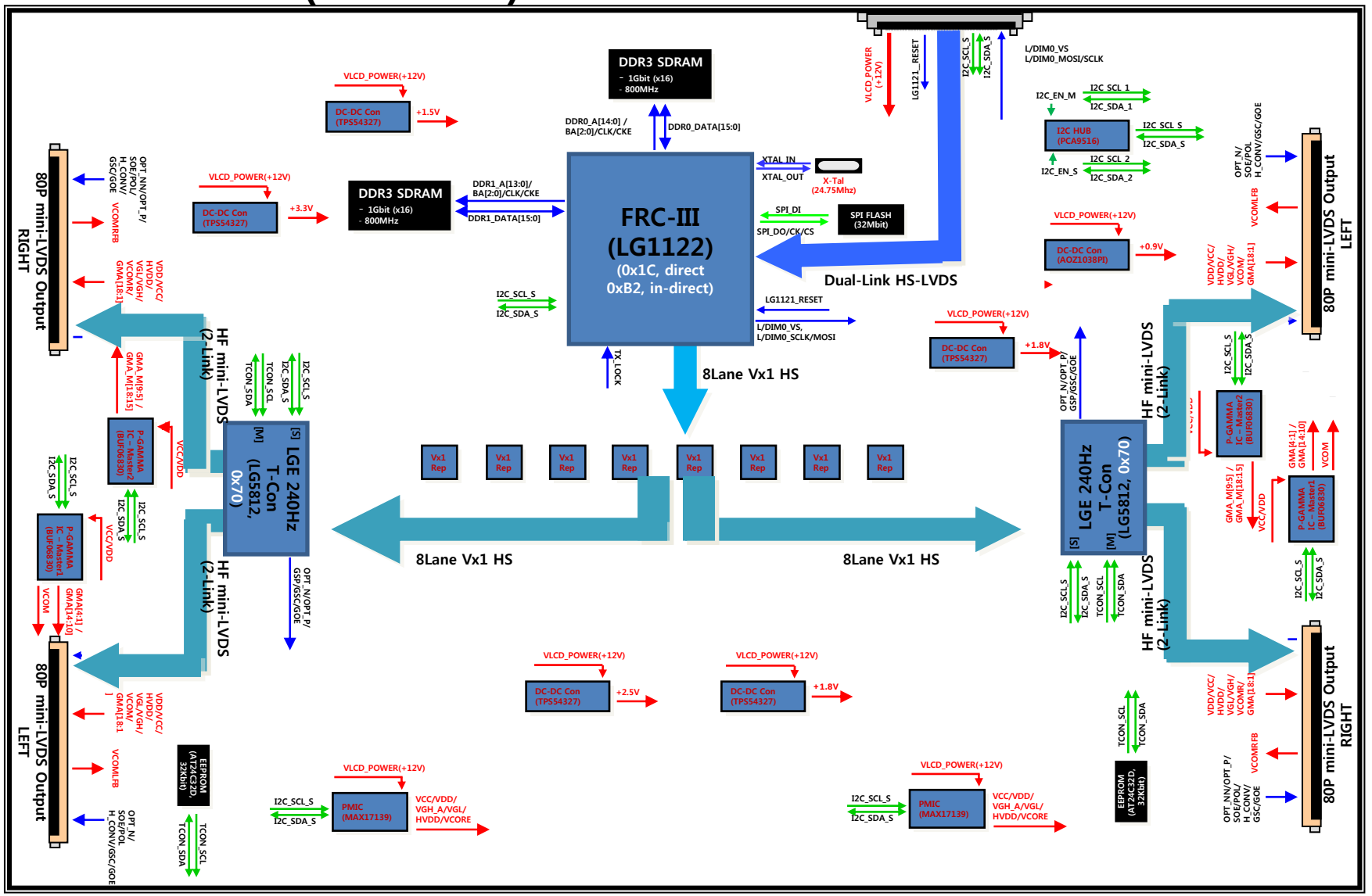
* FHD 120Hz, T240Hz (47/55LM8600)



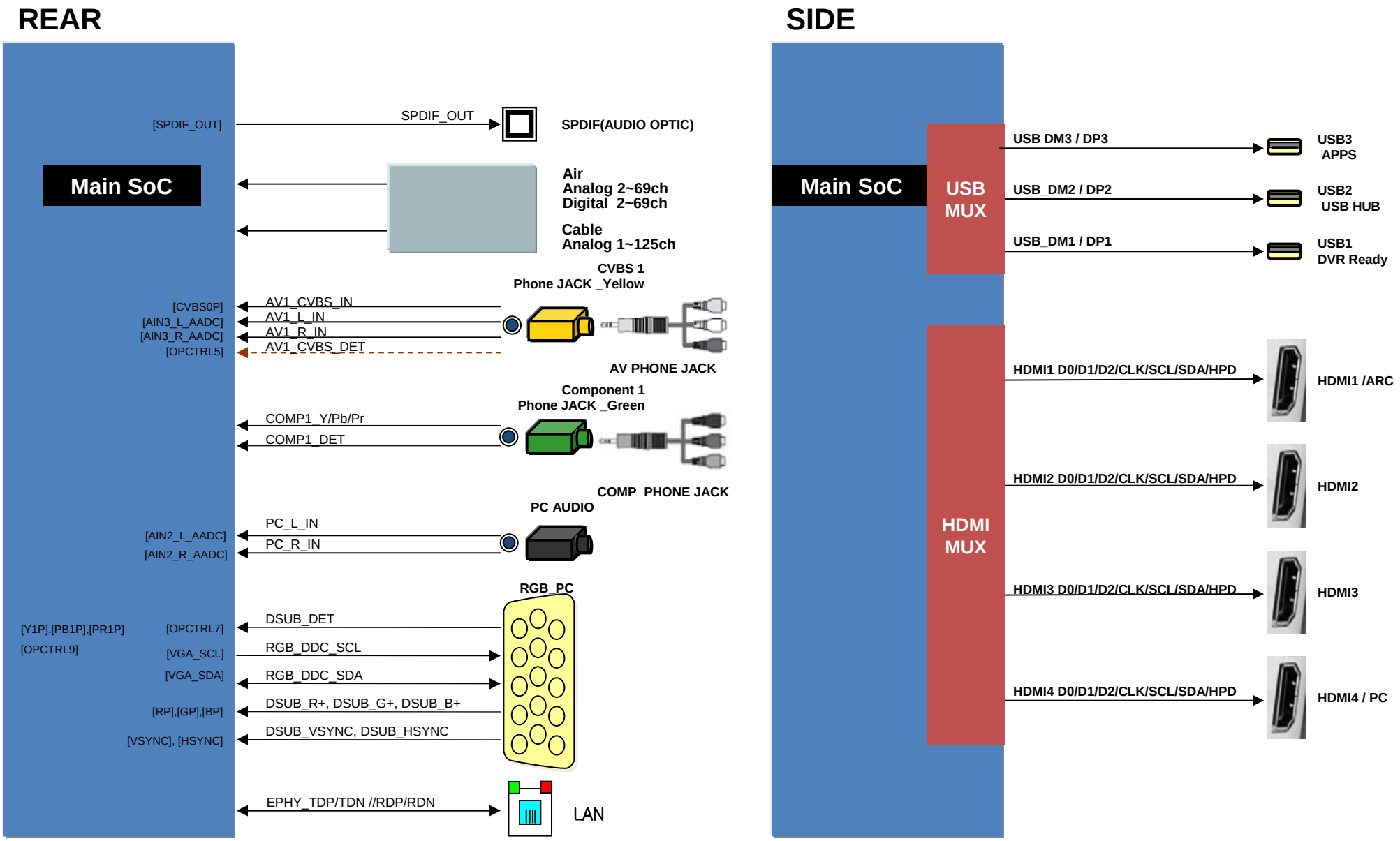
4. Block Diagram for High-end models(Back-end)

* FHD 240Hz T480Hz (72LM9500)

* Epoxy 4Layer 1.2T (206x183mm)

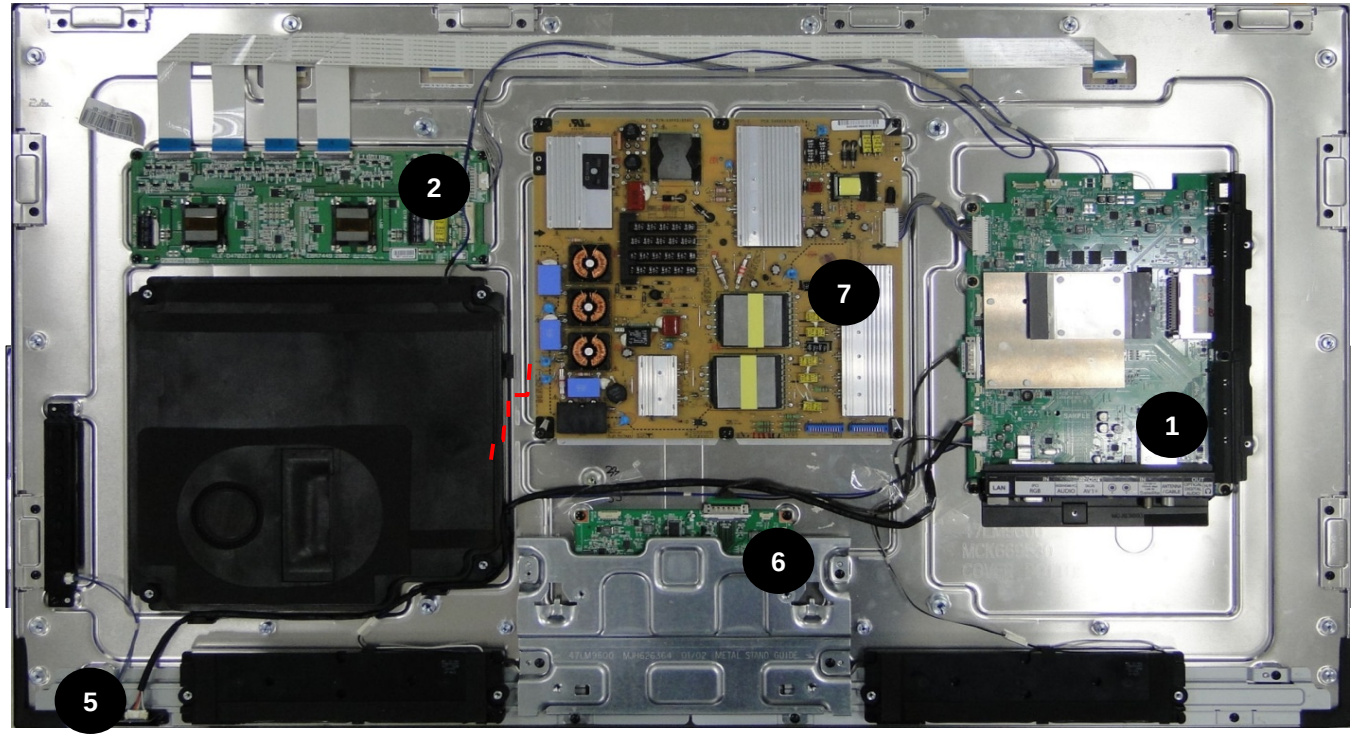


5. Jack Interface for High/Middle models



6. Interconnection for High-end models

xxLM9600-TA

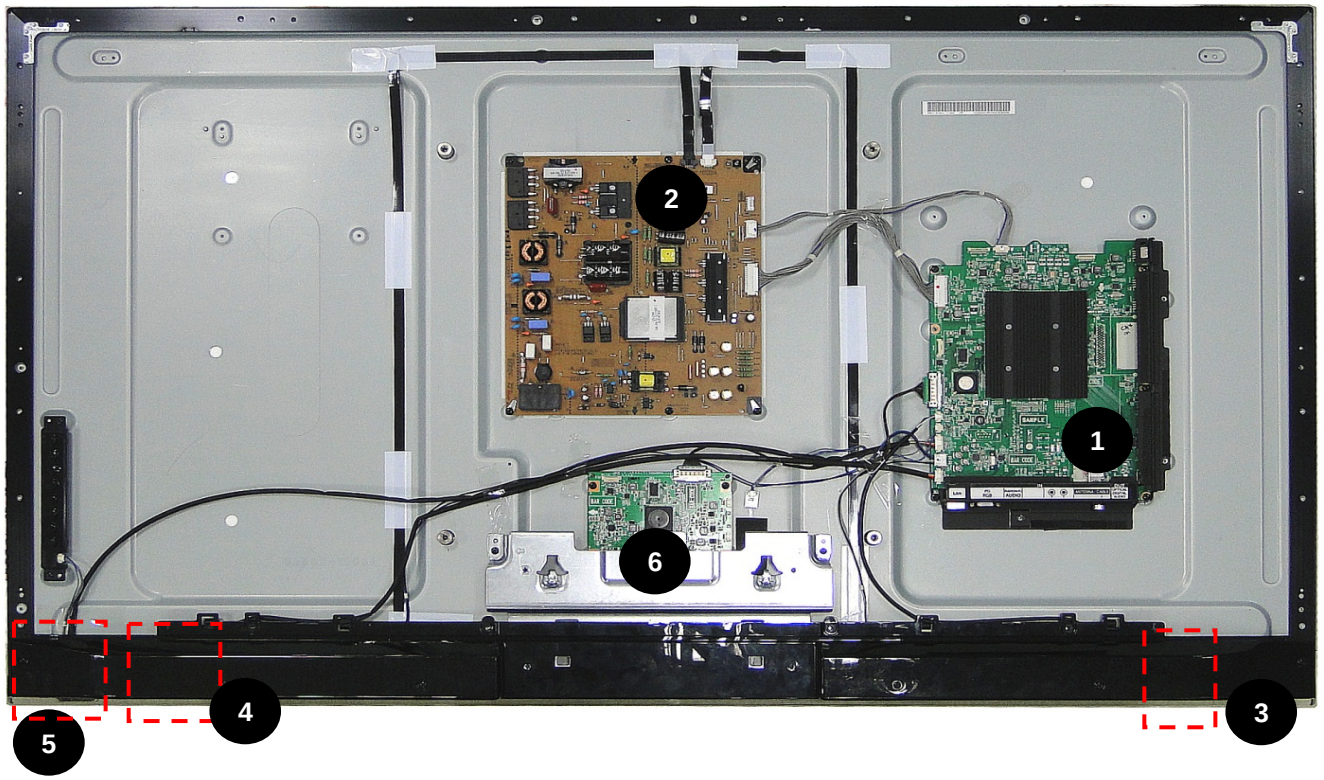


[PCBs]

1. Main PCB
2. LED driver
3. WIFI ASSY
4. RF MOTION ASSY
5. IR Key PCB
6. FRC ASSY
7. PSU

6. Interconnection for High-end models

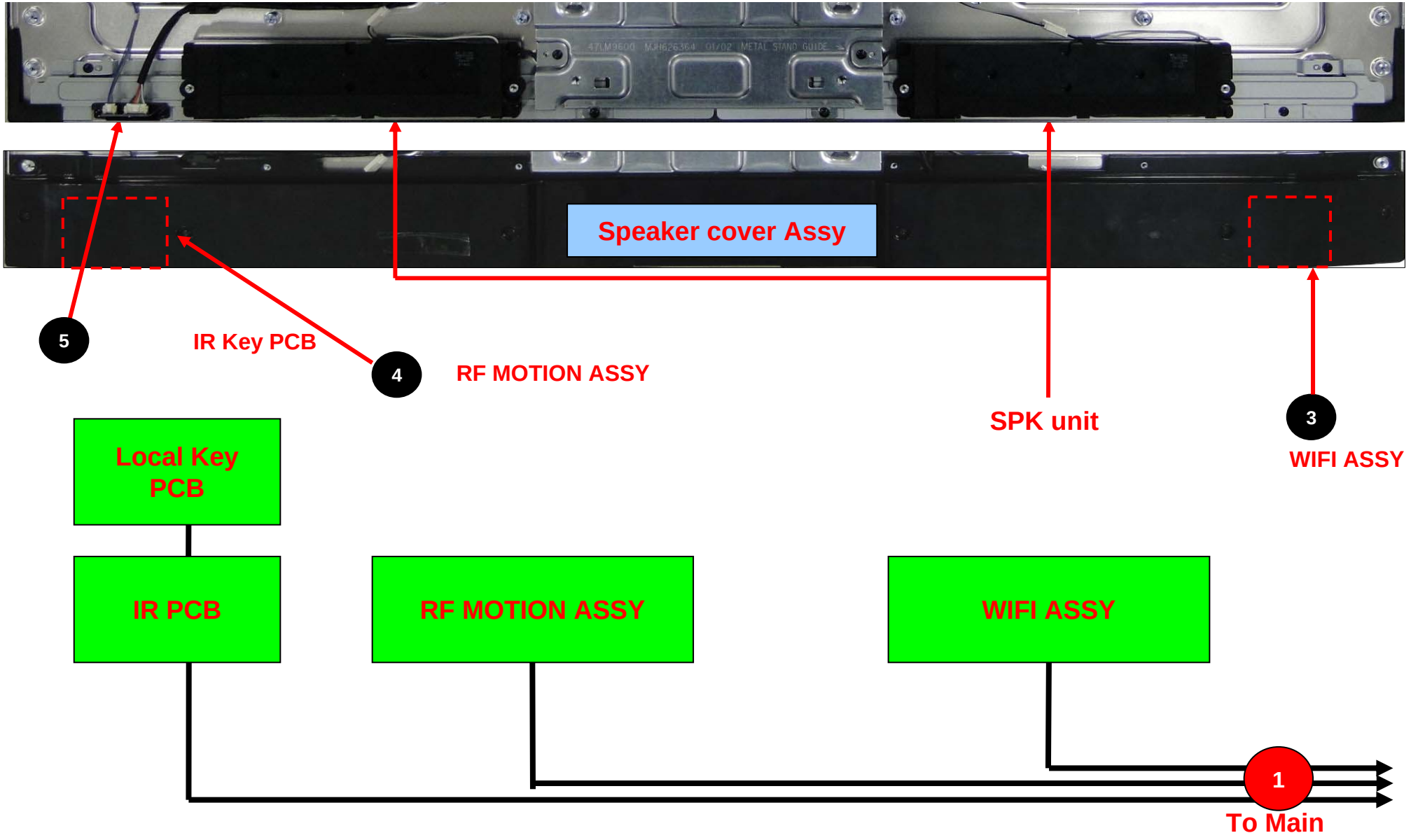
xxLM8600-TA



[PCBs]

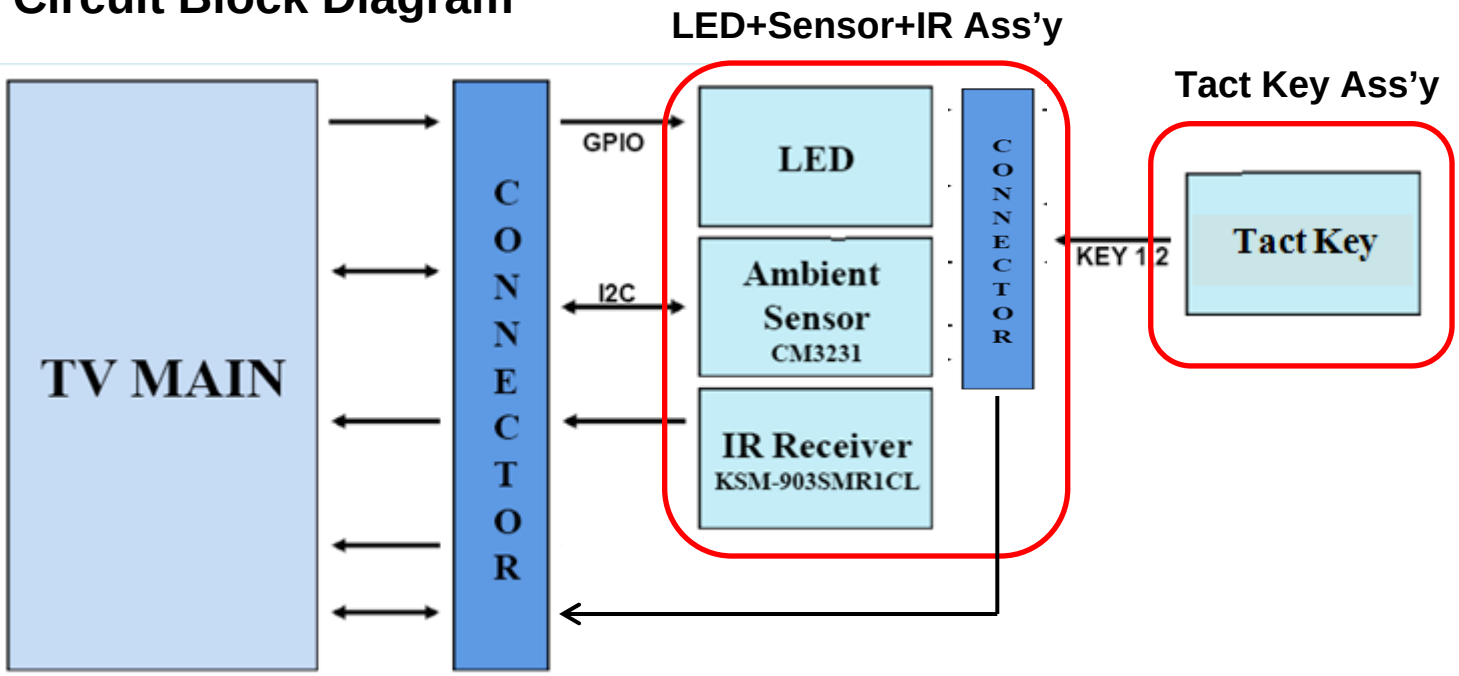
1. Main PCB
2. LPB
3. WIFI ASSY
4. RF MOTION ASSY
5. IR Key PCB
6. FRC ASSY

6. Interconnection for High-end models

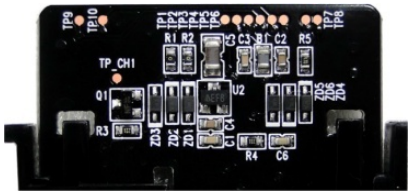


7. New Sub Assy : Tact key(Above LM6400 Series)

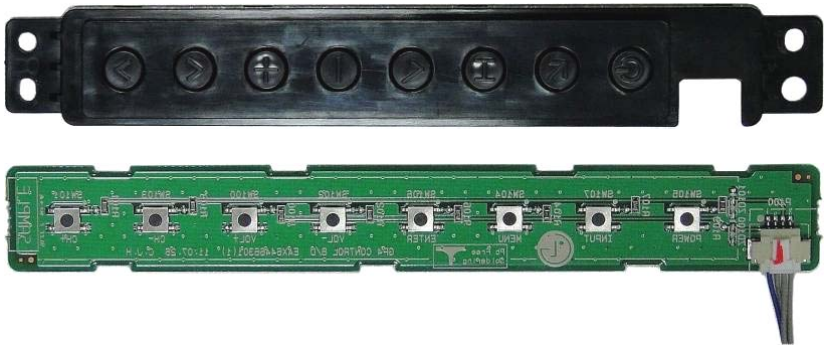
Circuit Block Diagram



▶ LED+Sensor+IR Ass'y Picture



▶ Tact Key Ass'y Picture



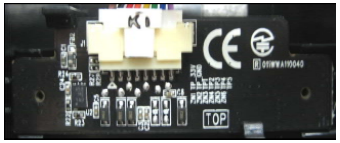
7. New Sub Assy : Magic Motion Remote Control(Above LM6400 Series)

* Motion Remote Controller

Remote

RF

LS5700//LM6200(Dongle)



LM6600//LM7600(Built in)

UART or USB

TV

❖ Pairing Information Transmission (Send to TV after Paired)
- Static Calibration Data (Bypass only)
- Remote FW ver. (Save also in Receiver)
- BD_ADDR (Save also in Receiver)

• Pairing Information Transmission Sequence
- When it is paired, the remote sends packets(pairing success, F/W version, BD_ADDR) to the receiver.
- The receiver sends the pairing success packet to TV directly.
- F/W version and BD_ADDR packets are just saved on the receiver.
- The receiver sends F/W version or BD_ADDR packet to TV when it is required.

❖ Motion Data Transmission
- Period : 7.5msec
- Motion Data : gyro, accelerometer

❖ Voice Data Transmission (not supported)
- Period : 10msec
- Voice sampling : 16khz 16bit

→ See “6-2. Packets” on page 8.

7. New Sub Assy : Magic Motion Remote Control

* RF Pairing / Un-pairing Method

	Method	Description
RF Pairing	❖ Method1 – If unpaired, just press "OK" button. – If paired, press "OK" button after unpairing. ❖ Method 2 (Repairing) – Press “BACK" button for 5 sec.	• When do pairing, the remote should make pairing request IR signal(0x29) to TV. • When TV receive the IR signal, it should send "pairing request packet" to the RF receiver. • After pairing success, the remote should blink LED for some time and TV send "pairing success packet" back to TV. • When remote try to unpairing, it doesn’t care about state of receiver(stand alone).
RF Unpairing	Press “HOME" button and “BACK" button at the same time for 5 sec.	• When remote try to unpairing, it doesn’t care about state of receiver(stand alone). • After unpairing, all pairing information should be erased. • After unpairing, LED should be blinked for 3sec. • The remote just becomes to IR mode.

7. New Sub Assy : Magic Motion Remote Control

* Function list

주요 Item			IC	Manufacturer	Function
Remocon	Voice	Voice Codec	WM8950	Wolfson	16KHz Sampling of Audio data
		MEMS Mic.	SPU0414HR5H	Knowles	Sensing Voice
	Motion Sensor	Gyro Sensor	ITG3050	Invensense	Sensing angular velocity of X, Y, Z-axis
		Accelerometer	MMA8452	Stmicro	Sensing device tilt (Pitch & Roll angle)
	RF + Micom	RF Antenna	SDBTPTR3015	Partron	Wireless communication
		X-tal	24MHz	Partron	
		RF + Micom	BCM20733	Broadcom	
	DC-DC Converter		TPS61097	TI	Battery Boost up Regulator
	LDO1		uPI7716	uPI	RF, Gyro, Accelerometer Power Supply
	LDO2		uPI7716	uPI	Audio Codec, Mic. Power Supply

12Y Widevine & HDCP 2.0 & NETFLX

Contents

- Widevine?
- HDCP 2.0 & NETFLIX?
- DTCP?
- Changed BOM

2011년 12월 22일

TV 사업부
TV 연구소

8. Adjust way of new features : Widevine

* Widevine

Widevine is the Solution(Library) offering Adaptive Streaming and DRM.
In BBTV, when special CP do service, this module is required key.
Currently CP which is requested to widevine, is typically Australian Bigpond Live and North American CinemaNow.
Furthermore, because the future will be the spread of CP, widevine key download for the global model should be applied to production.
(Because operation unique key should be downloaded for Widevine , Widevine key dowmload by NSU is impossible.)

[Widevine Key]
Widevine Key is unique data stored TV for using Widevine.

8. Adjust way of new features : HDCP2.0 & Netflix

* HDCP2.0

- ✓ High-bandwidth Digital Content Protection
- ✓ Protect high-value digital motion pictures, television programs and audio against unauthorized interception and copying between a digital set top box or digital video recorder and a digital TV or PC.
- ✓ Specification developed by Intel Corporation to protect digital entertainment across the DVI/HDMI interface.

❑ Why HDCP2.0?

- ✓ HDCP revision 2.0 supports a broader range of wired and **wireless** interfaces.

* NetFlix

- ✓ the services maintain a huge selection of movies and latest releases and offer DVD rentals via mail & online streaming.

8. Adjust way of new features : DTCP

* DTCP

[DTCP]

The Digital Transmission Content Protection Specification defines a cryptogrphic protocol for protecting audio/video entertainment content from unauthorized copying, intercepting, and tampering as it traverses digital transmission mechanisms such as a high-performance serial bus that conforms to the IEEE 1394-1995 standard. Only legitimate entertainment content delivered to a source device via another approved copy protection system (such as the DVD Content Scrambling System) will be protected by this protection system.

[Three cryptographic Keys]

• Authentication Key which is formed as a result of authentication and used to protect the exchange keys.

•Exchage Key which is used to set up and protect content streams.

•Content Key which is used to encrpt the content being exchanged.

9. Repair guide

Contents of LCD TV Standard Repair Process

No.	Error symptom (High category)	Error symptom (Mid category)	Page	Remarks
1	A. Video error	No video/Normal audio	1	
2		No video/No audio	2	
3		Video error, video lag/stop, fail tunning	3, 4	
4		Color error	5	
5		Vertical/Horizontal bar, residual image, light spot, external device color error	6	
6	B. Power error	No power	7	
7		Off when on, off while viewing, power auto on/off	8	
8	C. Audio error	No audio/Normal video	9	
9		Wrecked audio/discontinuation/noise	10	
10	D. Function error	No response in remote controller, key error, recording error, memory error	11	
11		External device recognition error	12	
12	E. Noise	Circuit noise, mechanical noise	13	
13	F. Exterior error	Exterior defect	14	

First of all, Check whether there is SVC Bulletin in GCSC System for these model.

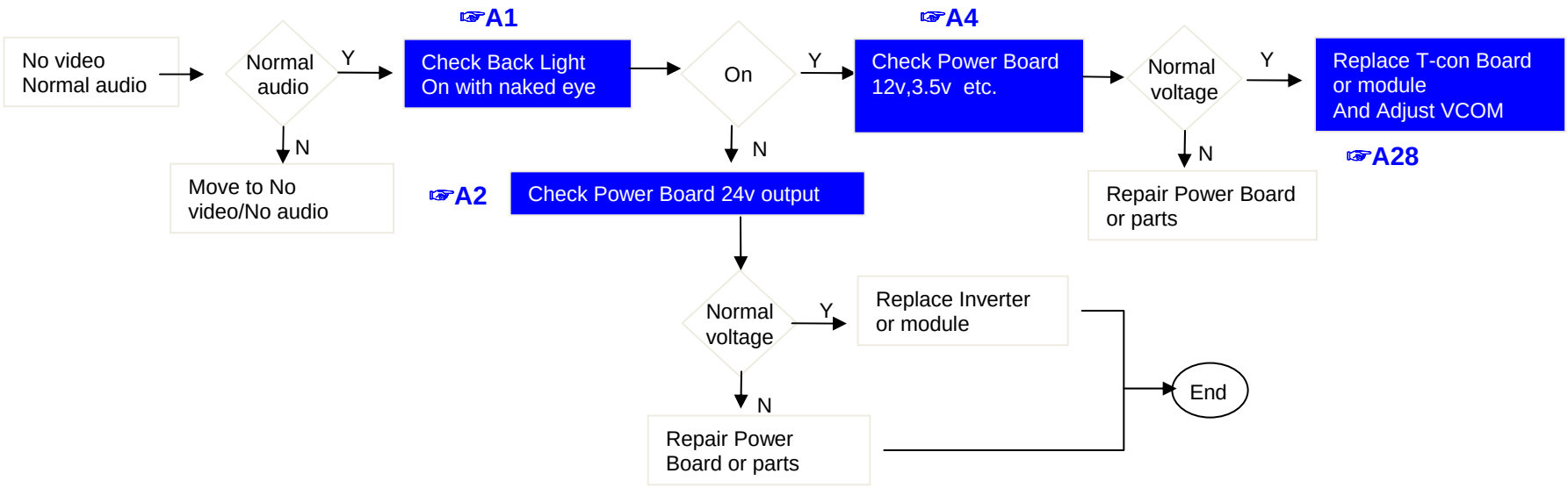
Contents of LCD TV Standard Repair Process Detail Technical Manual

No.	Error symptom	Content	Page	Remarks
1	A. Video error_ No video/Normal audio	Check LCD back light with naked eye	A1	
2		LED driver B+ 24V measuring method	A2	
3		Check White Balance value	A3	
4		Power Board voltage measuring method	A4	
6	A. Video error_ No video/Video lag/stop	TUNER input signal strength checking method	A6	
7		LCD-TV Version checking method	A7	
9	A. Video error_Color error	LCD TV connection diagram	A8	
10		Tuner Checking Part	A9	
11		Check Link Cable (LVDS) reconnection condition	A10 A11	A10 : 32/37/42/47/55 A11 : 32 AUO
12		Adjustment Test pattern - ADJ Key	A12	
13	A. Video error_Vertical/Horizontal bar, residual image, light spot	LCD TV connection diagram	A8	
14		Check Link Cable (LVDS) reconnection condition	A10 A11	A10 : 32/37/42/47/55 A11 : 32 AUO
15		Adjustment Test pattern - ADJ Key	A12	
16	**<Appendix>** Defected Type caused by T-Con/ Inverter/ Module	Exchange T-Con Board (1)	A-1/5	
17		Exchange T-Con Board (2)	A-2/5	
18		Exchange LED driver Board (PSU)	A-3/5	55” : driver board Other : PSU
19		Exchange Module itself (1)	A-4/5	
20		Exchange Module itself (2)	A-5/5	

Standard Repair Process

LCD TV	Error symptom	A. Video error	Established date	2010. 12 .14	
		No video/ Normal audio	Revised date		1/13

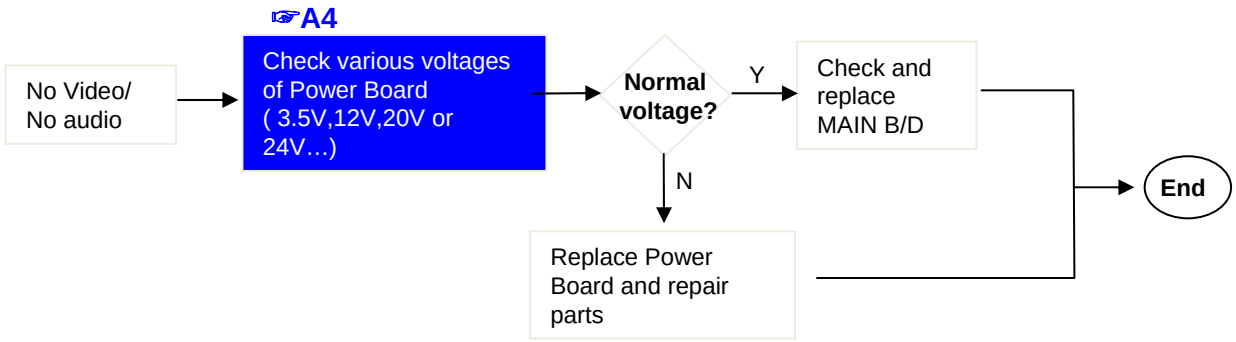
First of all, Check whether all of cables between board is inserted properly or not.
(Main B/D↔ Power B/D, LVDS Cable,Speaker Cable,IR B/D Cable,,,)



※Precaution ☞A7 & A3

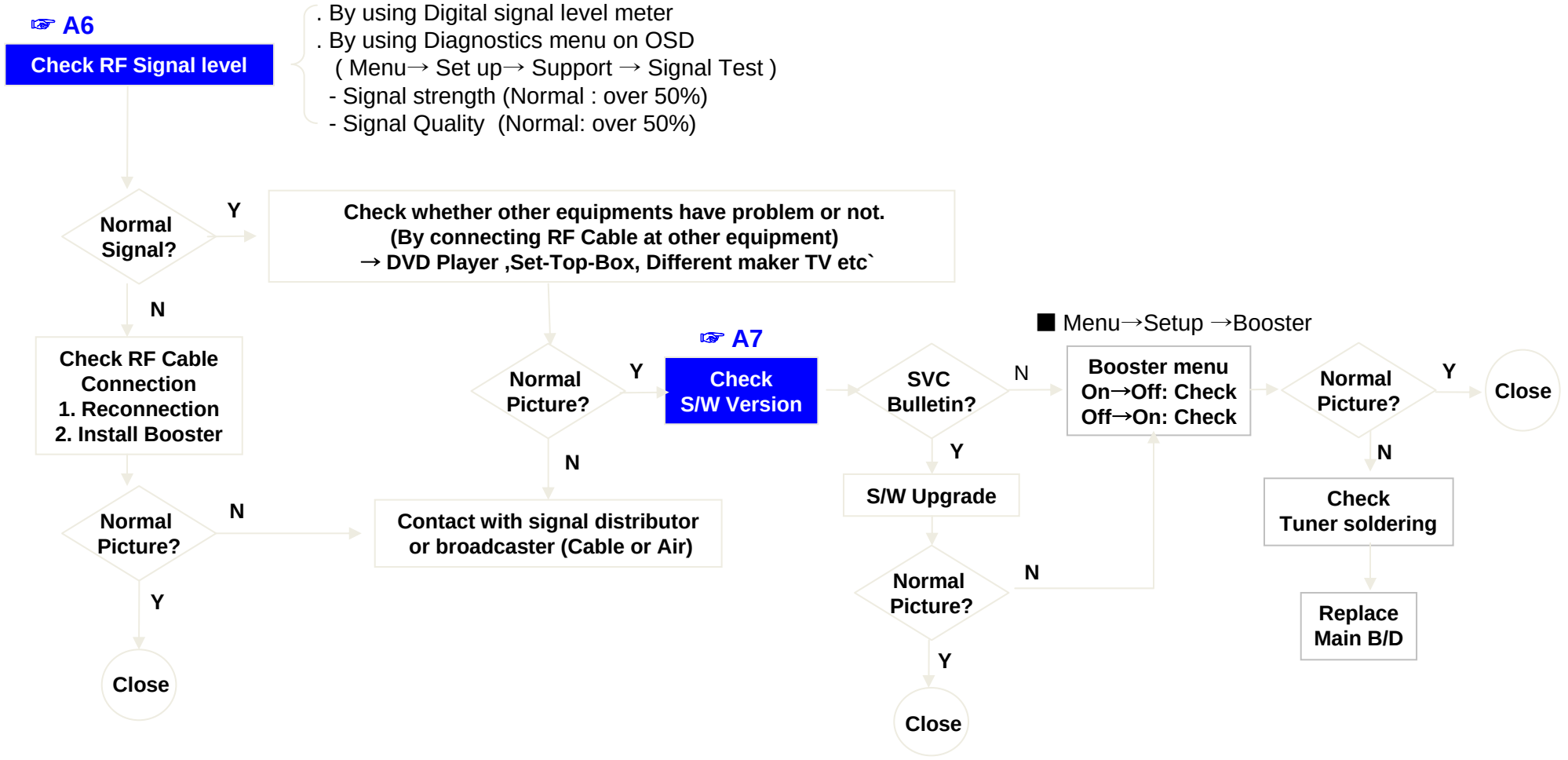
Always check & record S/W Version and White Balance value before replacing the Main Board → Replace Main Board → Re-enter White Balance value

LCD TV	Error symptom	A. Video error	Established date	2010. 12 .14	
		No video/ No audio	Revised date		2/13



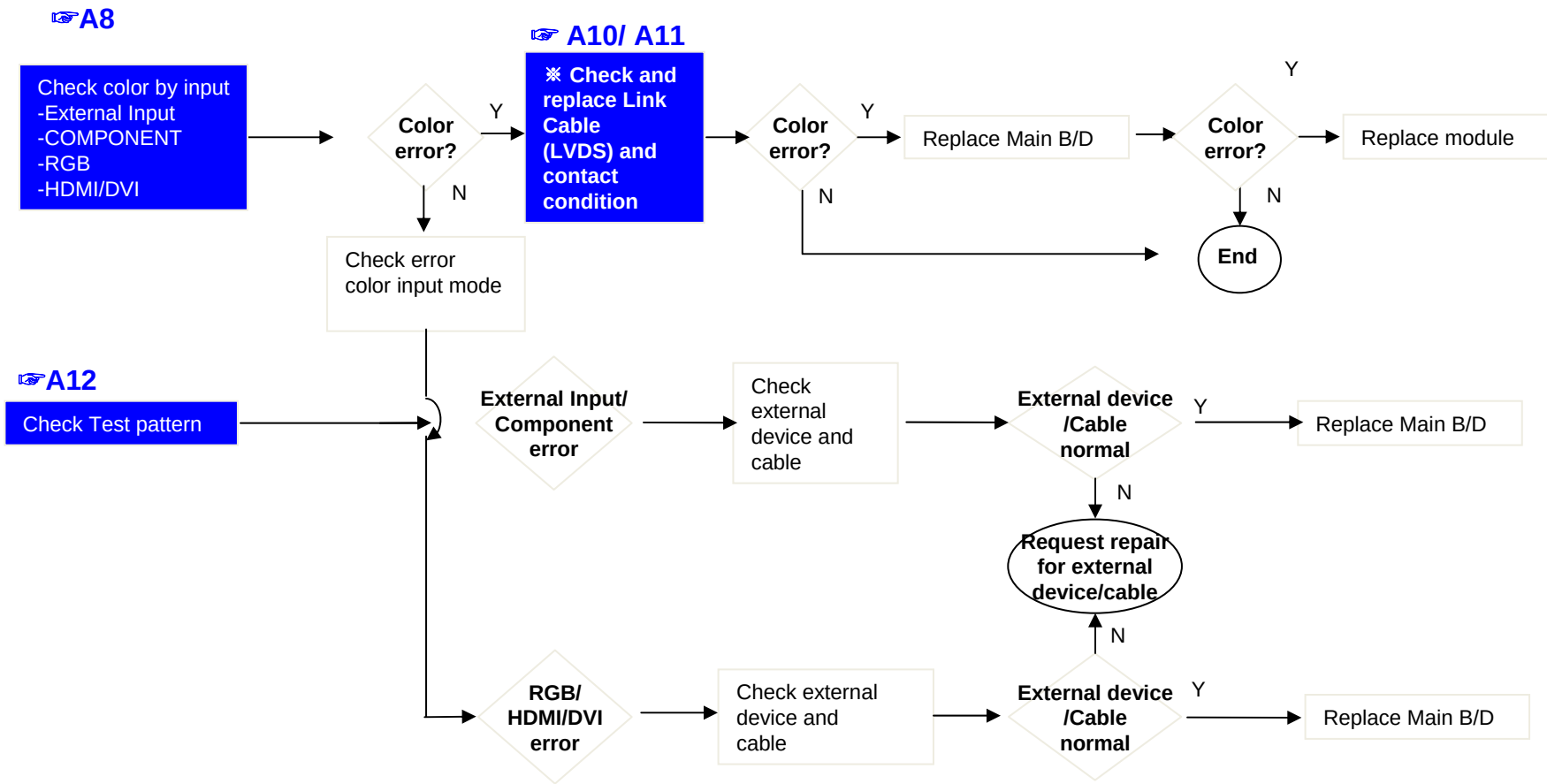
Standard Repair Process

LCD TV	Error symptom	A. Picture Problem	Established date	2010. 12 .14	
		Picture broken/ Freezing	Revised date		3/13



Standard Repair Process

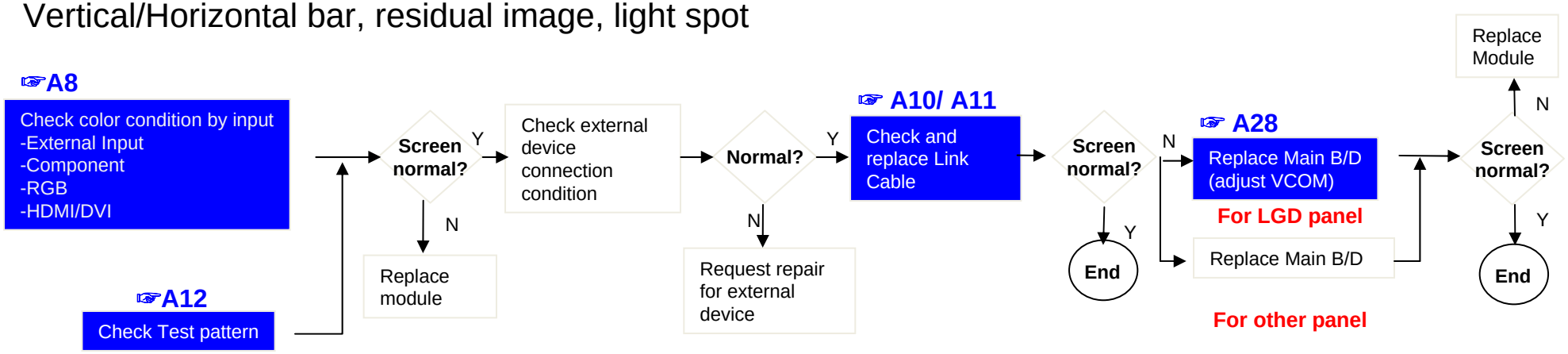
LCD TV	Error symptom	A. Video error	Established date	2010. 12 .14	
		Color error	Revised date		4/13



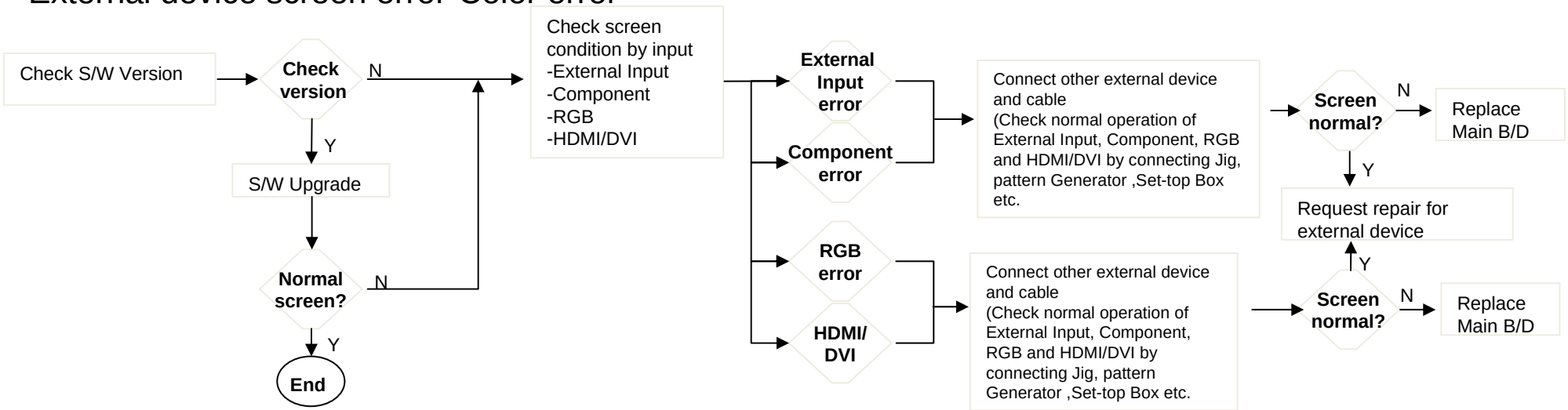
Standard Repair Process

LCD TV	Error symptom	A. Video error	Established date	2010. 12 .14	
		Vertical / Horizontal bar, residual image, light spot, external device color error	Revised date		5/13

Vertical/Horizontal bar, residual image, light spot

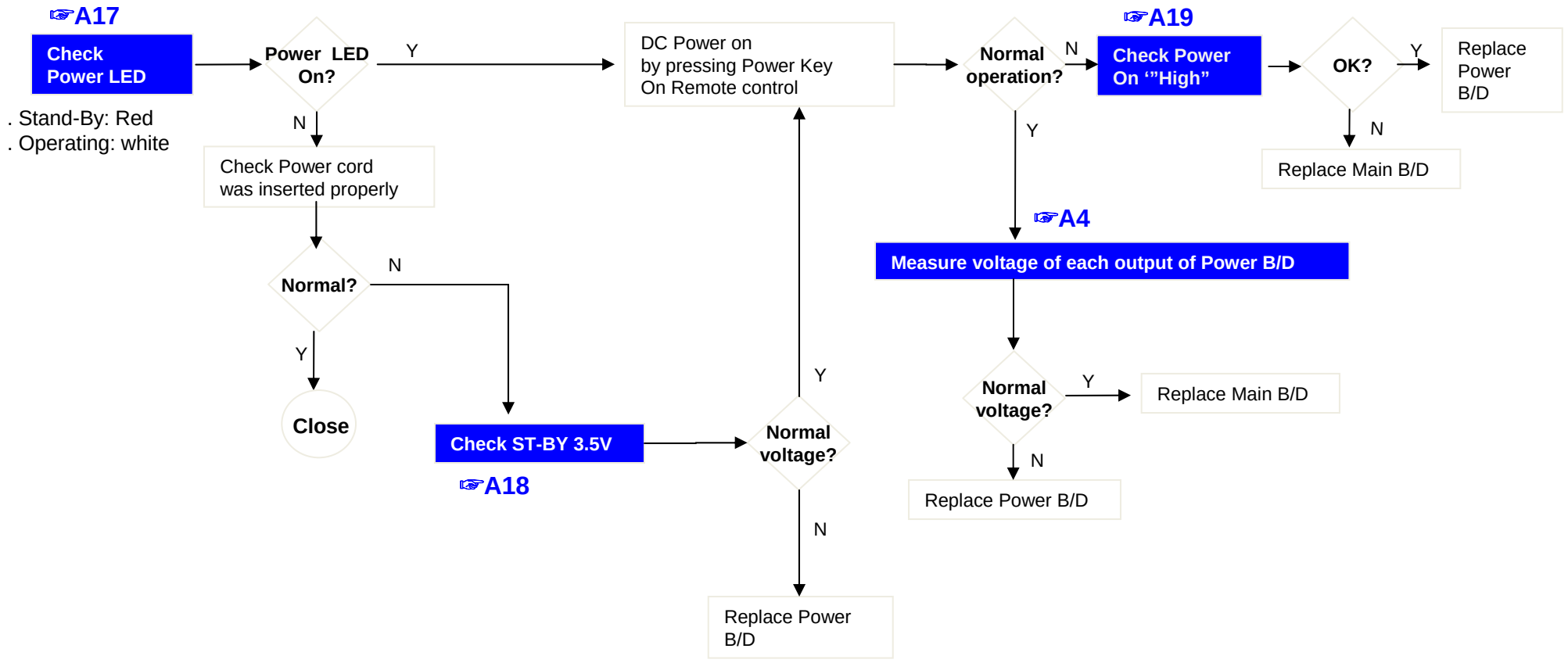


External device screen error-Color error



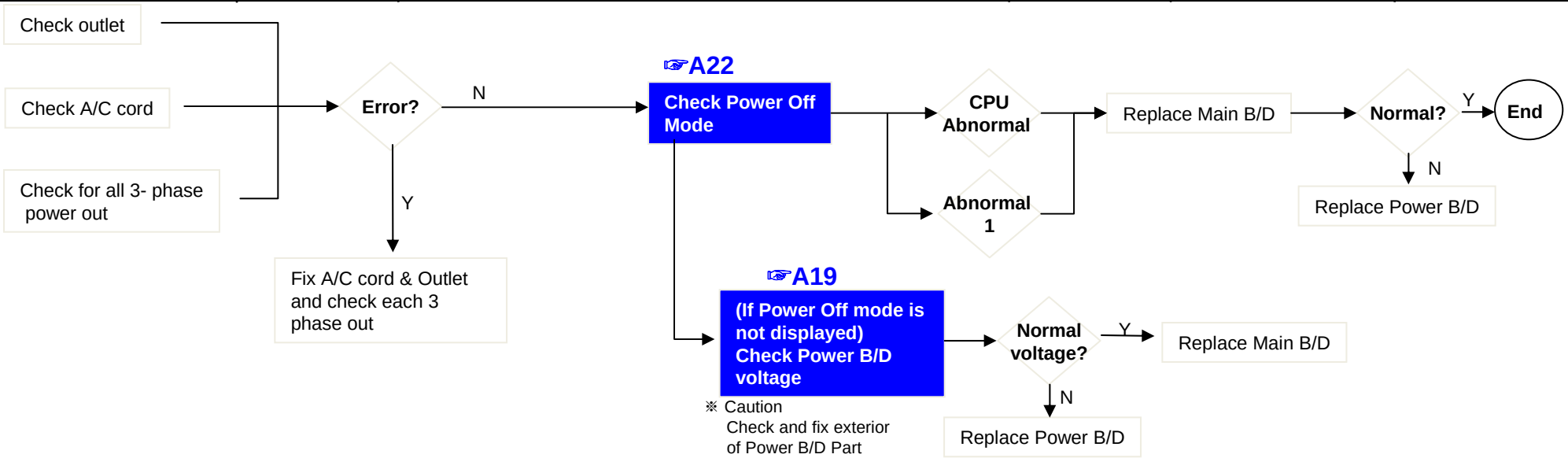
Standard Repair Process

LCD TV	Error symptom	B. Power error	Established date	2010. 12 .14	
		No power	Revised date		6/13



Standard Repair Process

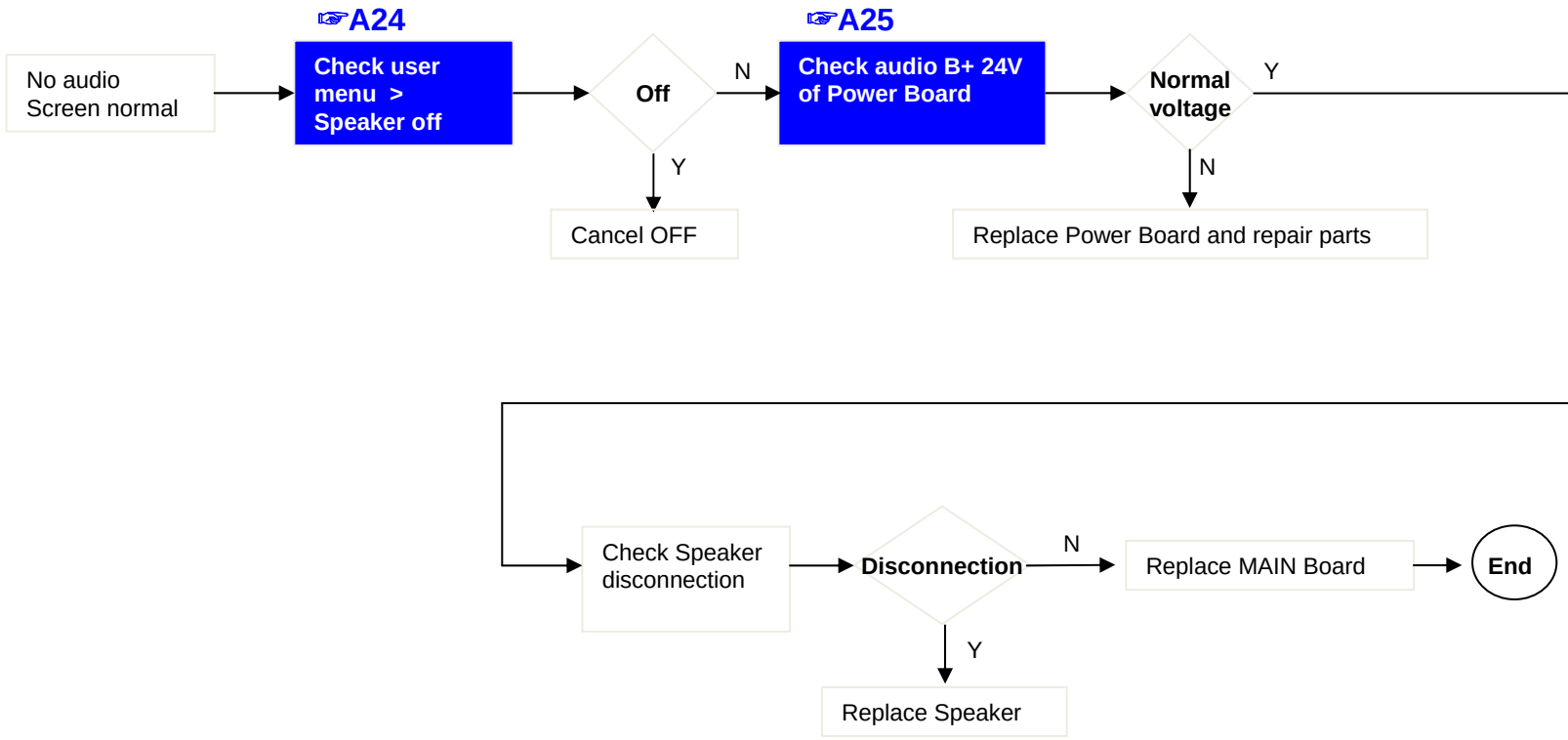
LCD TV	Error symptom	B. Power error	Established date	2010. 12 .14	
		Off when on, off while viewing, power auto on/off	Revised date		7/13



*** Please refer to the all cases which can be displayed on power off mode.**

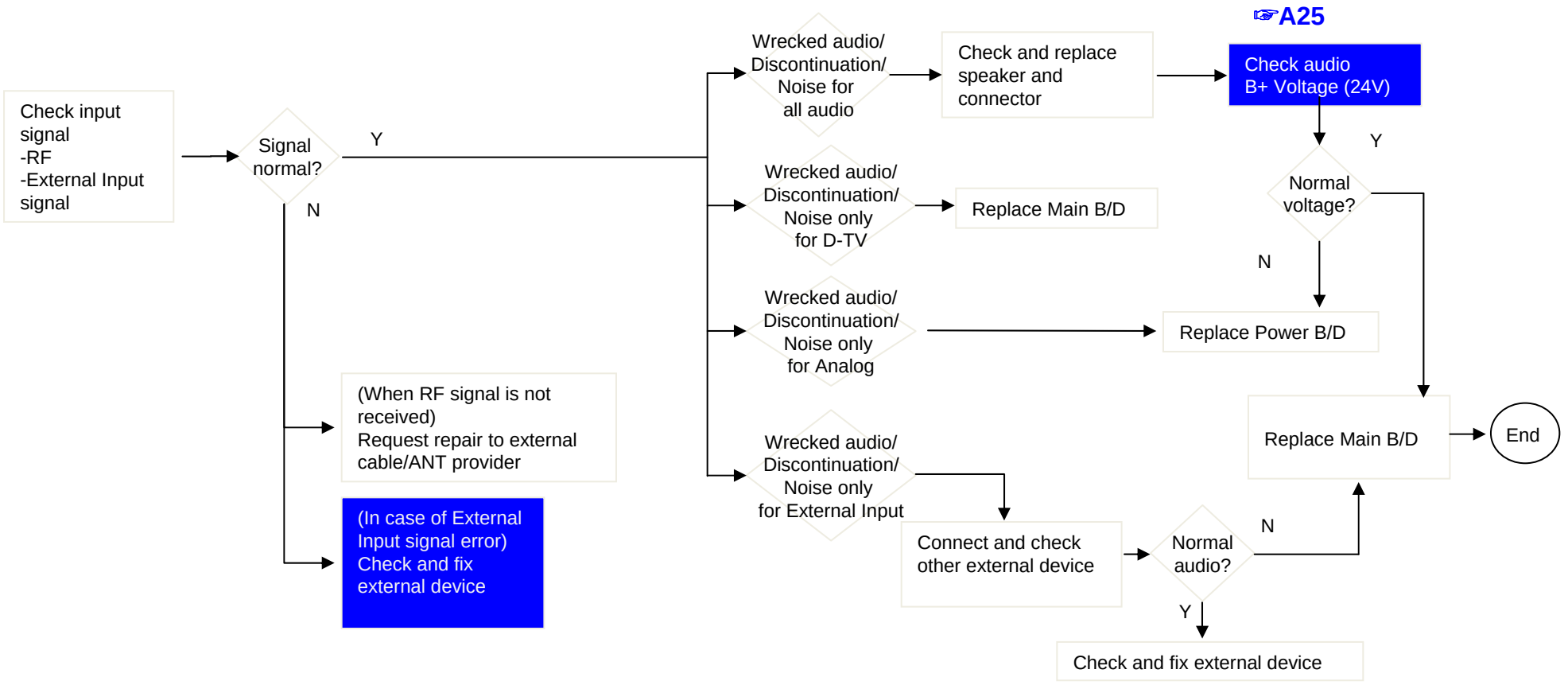
Status	Power off List	Explanation
Normal	"POWEROFF_REMOTEKEY"	Power off by REMOTE CONTROL
	"POWEROFF_OFFTIMER"	Power off by OFF TIMER
	"POWEROFF_SLEEPTIMER"	Power off by SLEEP TIMER
	"POWEROFF_INSTOP"	Power off by INSTOP KEY
	"POWEROFF_AUTOOFF"	Power off by AUTO OFF
	"POWEROFF_ONTIMER"	Power off by ON TIMER
	"POWEROFF_RS232C"	Power off by RS232C
	"POWEROFF_RESREC"	Power off by Reservated Record
	"POWEROFF_RECEND"	Power off by End of Recording
	"POWEROFF_SWDOWN"	Power off by S/W Download
	"POWEROFF_UNKNOWN"	Power off by unknown status except listed case
Abnormal	"POWEROFF_ABNORMAL1"	Power off by abnormal status except CPU trouble
	"POWEROFF_CPUABNORMAL"	Power off by CPU Abnormal

LCD TV	Error symptom	C. Audio error	Established date	2010. 12 .14	
		No audio/ Normal video	Revised date		8/13



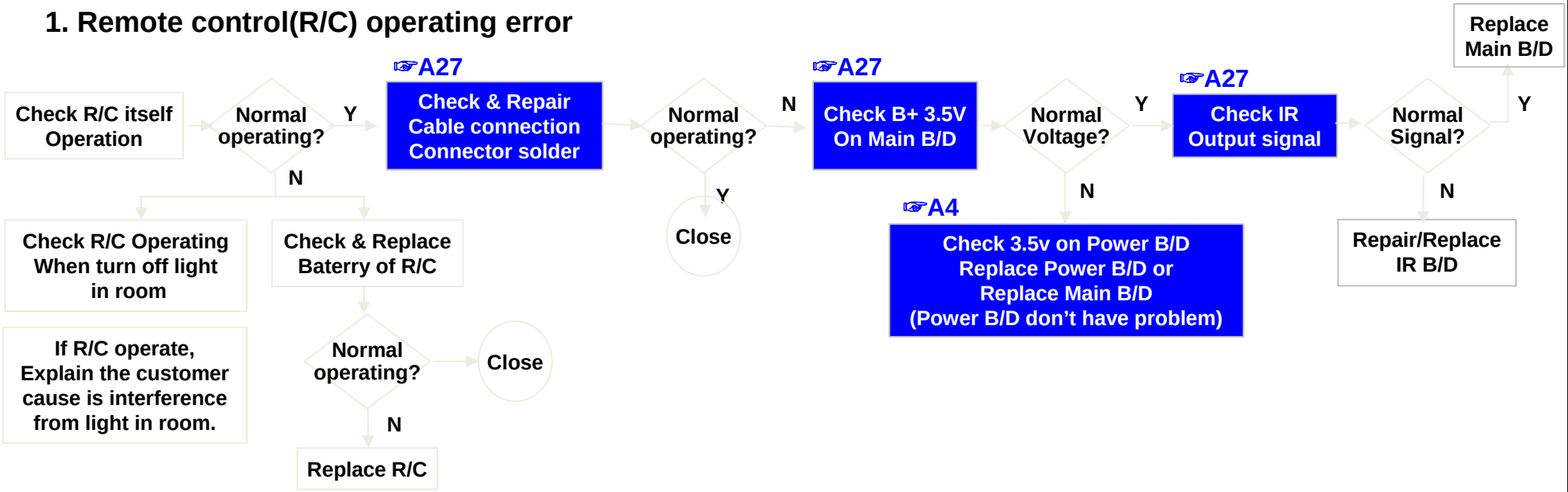
LCD TV	Error symptom	C. Audio error	Established date	2010. 12 .14	
		Wrecked audio/ discontinuation/noise	Revised date		9/13

→ abnormal audio/discontinuation/noise is same after “Check input signal” compared to No audio

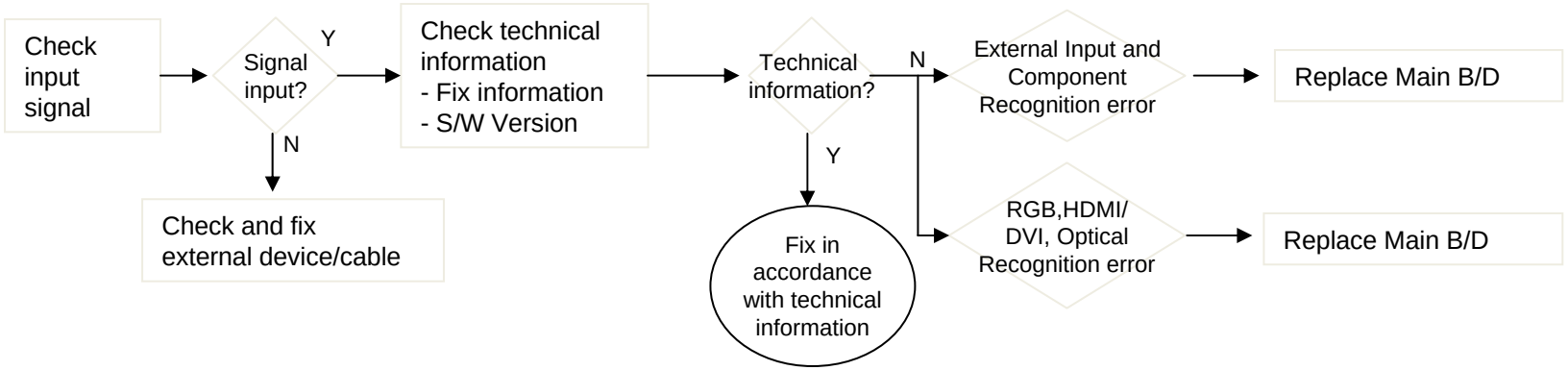


LCD TV	Error symptom	D. General Function Problem	Established date	2010. 12 .14	
		Remote control & Local switch checking	Revised date		10/13

1. Remote control(R/C) operating error

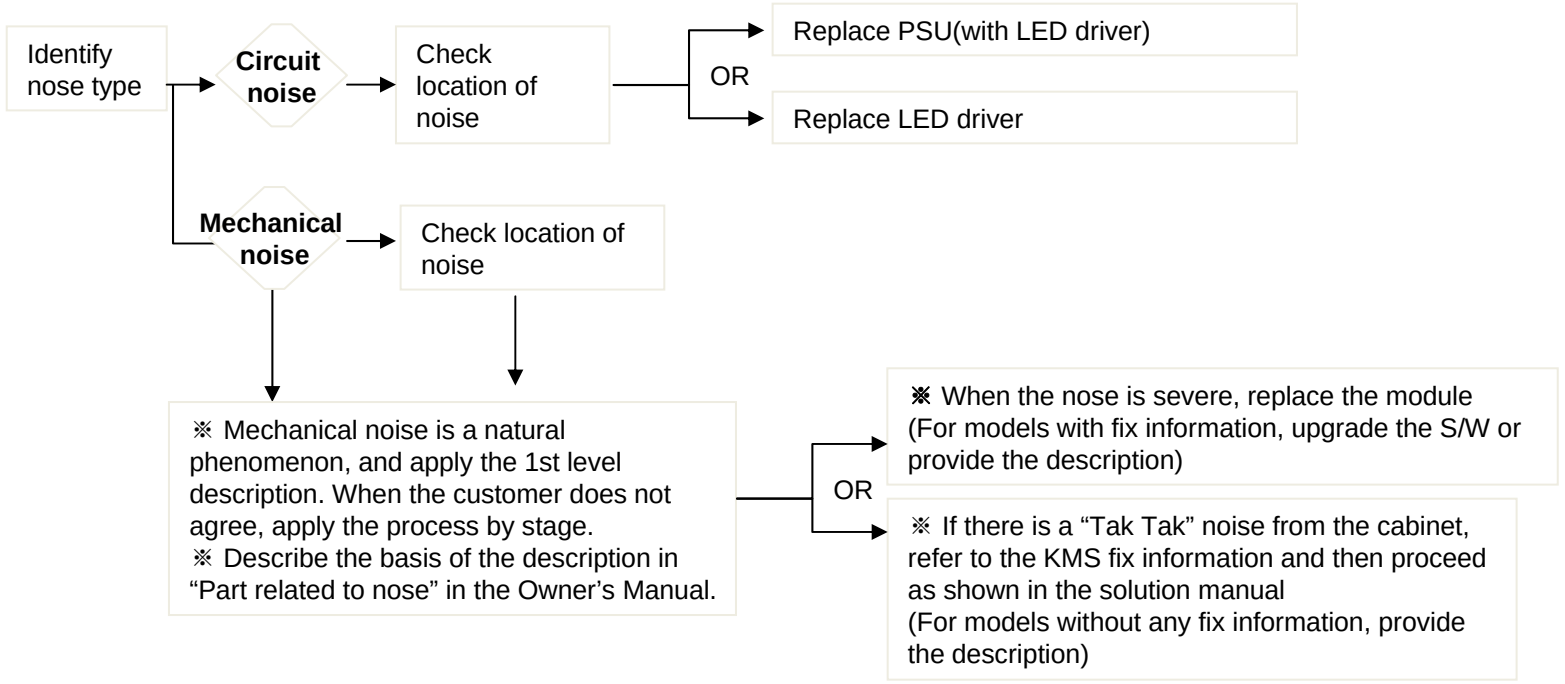


LCD TV	Error symptom	D. Function error	Established date	2010. 12 .14	
		External device recognition error	Revised date		11/13



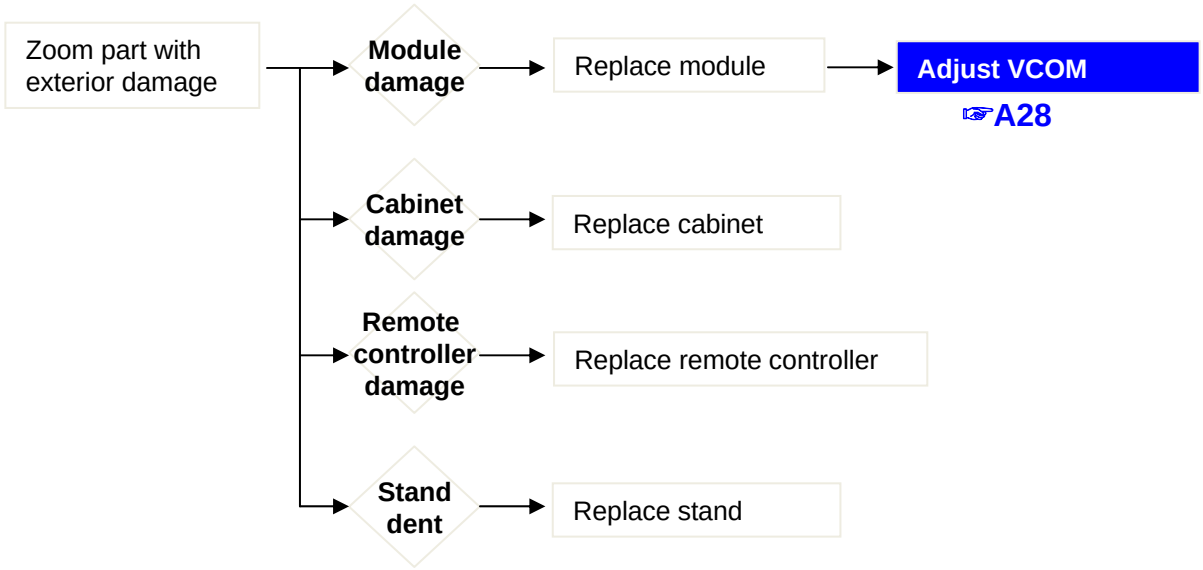
Standard Repair Process

LCD TV	Error symptom	E. Noise	Established date	2010. 12 .14	
		Circuit noise, mechanical noise	Revised date		12/13



Standard Repair Process

LCD TV	Error symptom	F. Exterior defect	Established date	2010. 12 .14	
		Exterior defect	Revised date		13/13



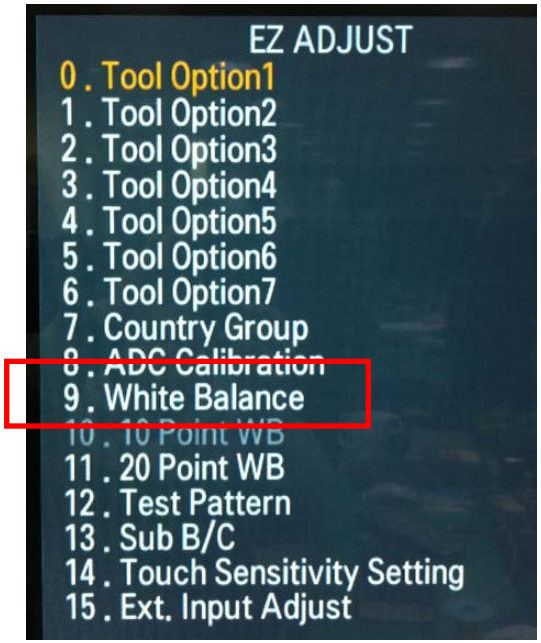
Contents of LCD TV Standard Repair Process Detail Technical Manual

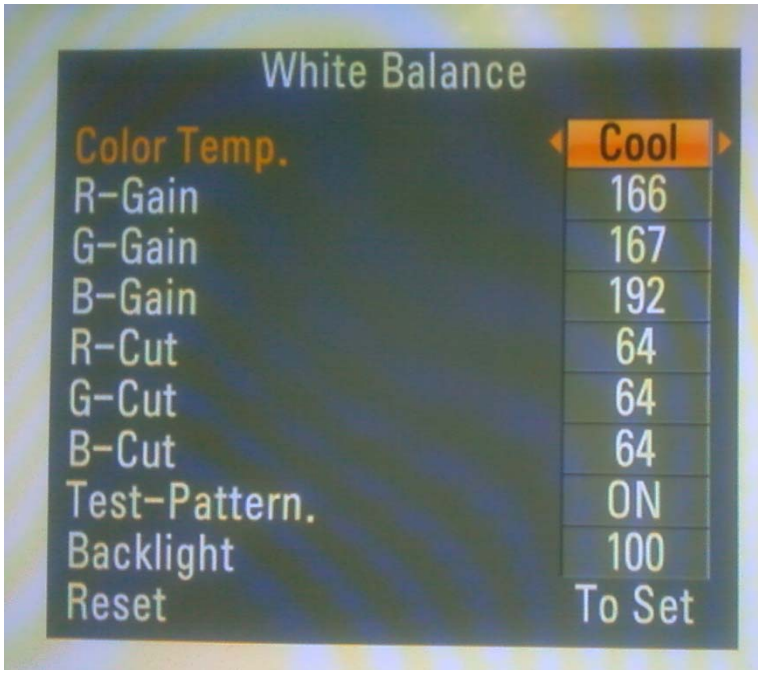
Continued from previous page

No.	Error symptom	Content	Page	Remarks
21	B. Power error_No power	Check front display LED	A17	
22		Check power input Voltage & ST-BY 5V	A18	
23		Checking method when power is ON	A19	
24		POWER BOARD voltage measuring method	A4	
25				
26	B. Power error_Off when on, off while viewing	POWER OFF MODE checking method	A22	
27	B. Power error_Off when on, off while viewing	POWER BOARD PIN voltage checking method	A19	
28	C. Audio error_No audio/Normal video	Checking method in menu when there is no audio	A24	
29		Voltage and speaker checking method when there is no audio	A25	
30	C. Audio error_Wrecked audio/discontinuation	Voltage and speaker checking method in case of audio error	A25	
31	D. Function error_ No response in remote controller, key error	Remote controller operation checking method	A27	
32	D. VCOM Adjustment	Sequence of the Vcom adjustment	A28	

LCD TV	Error symptom	A. Video error_No video/Normal audio	Established date	2010. 12 .14	
	Content	Check White Balance value	Revised date		A4

<ALL MODELS>





Entry method

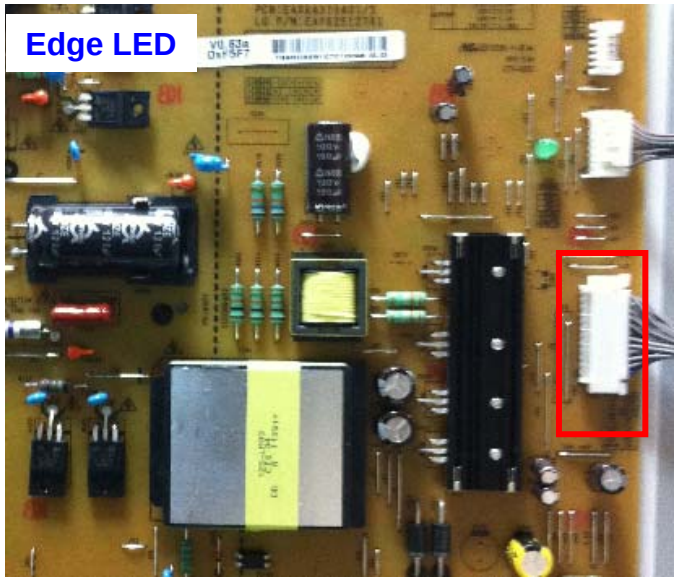
1. Press the ADJ button on the remote controller for adjustment.

2. Enter into White Balance of item 7.

3. After recording the R, G, B (GAIN, Cut) value of Color Temp (Cool/Medium/Warm), re-enter the value after replacing the MAIN BOARD.

LCD TV	Error symptom	A. Video error_No video/ Audio	Established date	2010. 12 .14	
	Content	Power Board voltage measuring method	Revised date		A5

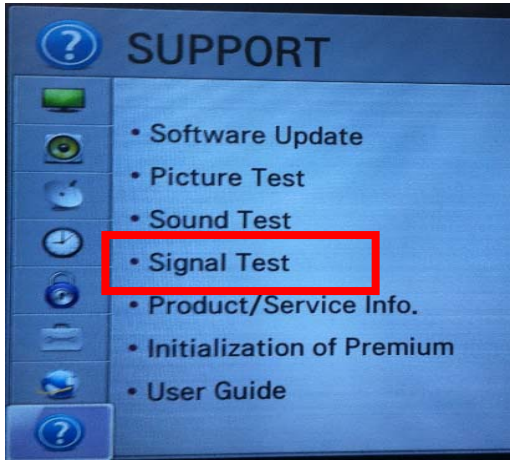
Check the DC 24V, 12V, 3.5V.

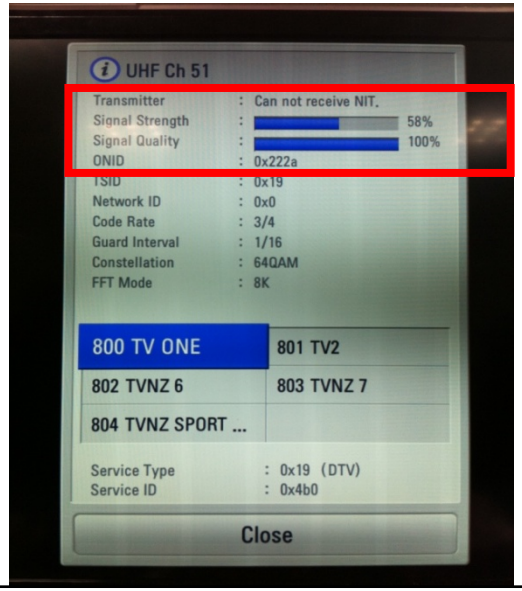


24 Pin (Power Board ↔ Main Board) – 공통			
SMAW200-H24S (YEONHO)			
1	Power on	2	24V
3	24V	4	24V
5	GND	6	GND
7	GND	8	GND
9	3.5V	10	3.5V
11	3.5V	12	3.5V
13	GND	14	GND
15	GND	16	GND
17	12V	18	Inverter On/off
19	12V	20	Lamp : A-Dim LED : N.C
21	12V	22	PWM Dim #1
23	GND/P_DIM2 • Lamp SCANNING Model : PWM Dim #2	24	Error-out

LCD TV	Error symptom	A. Video error_Video error, video lag/stop	Established date	2010. 12 .14	
	Content	TUNER input signal strength checking method	Revised date		A6

<ALL MODELS>





MENU -→ Set up → support -→ signal test -→ select channel

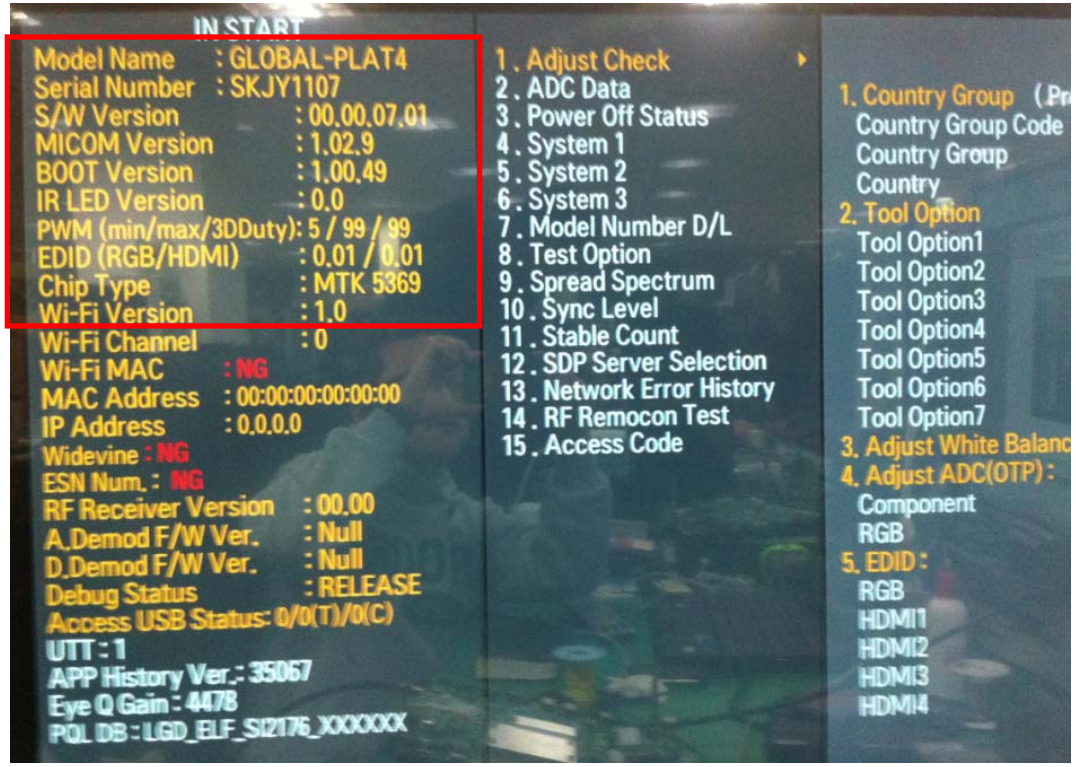
When the signal is strong, use the attenuator (-10dB, -15dB, -20dB etc.)

LCD TV	Error symptom	A. Video error_Video error, video lag/stop	Established date	2010. 12 .14	
	Content	LCD-TV Version checking method	Revised date		A7

<ALL MODELS>

1. Checking method for remote controller for adjustment

Version



Press the IN-START with the remote controller for adjustment

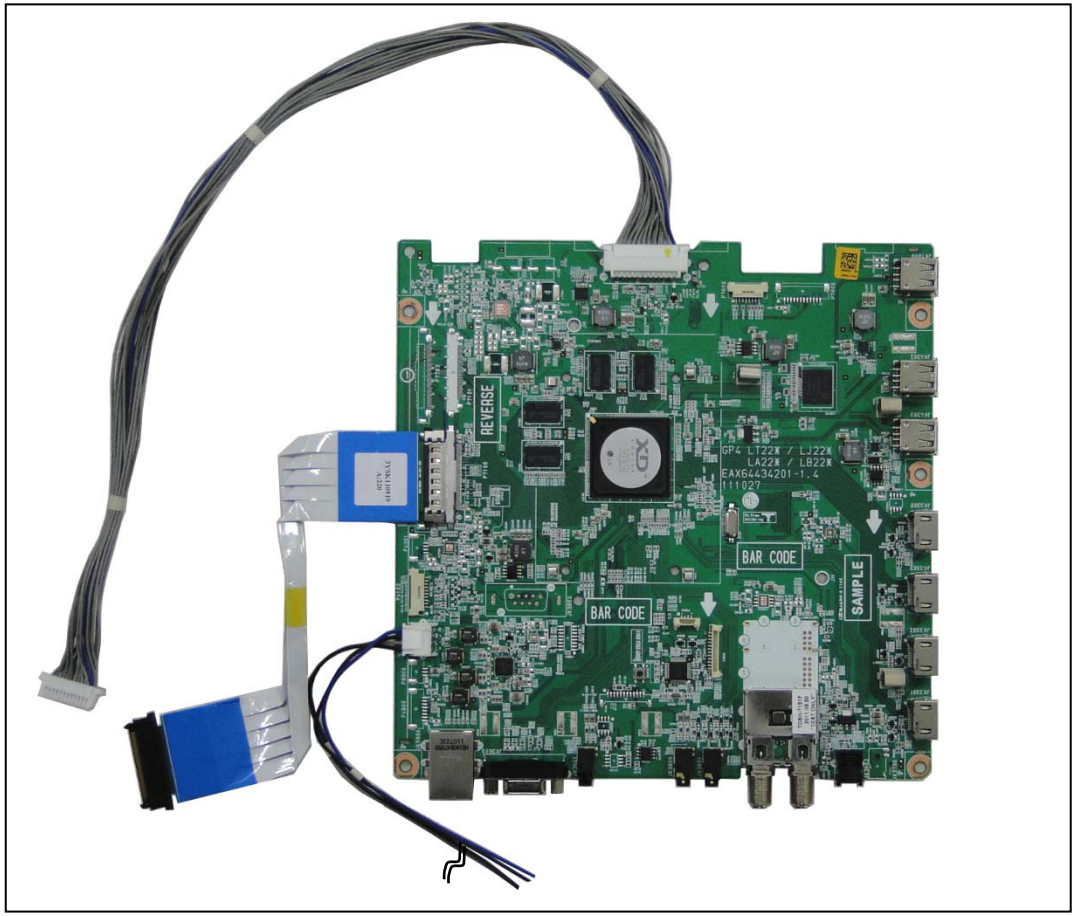
LCD TV	Error symptom	A. Video error _Vertical/Horizontal bar, residual image, light spot	Established date	2010. 12 .14	
	Content	LCD TV connection diagram (1)	Revised date		A8

<ALL MODELS>

As the part connecting to the external input, check the screen condition by signal

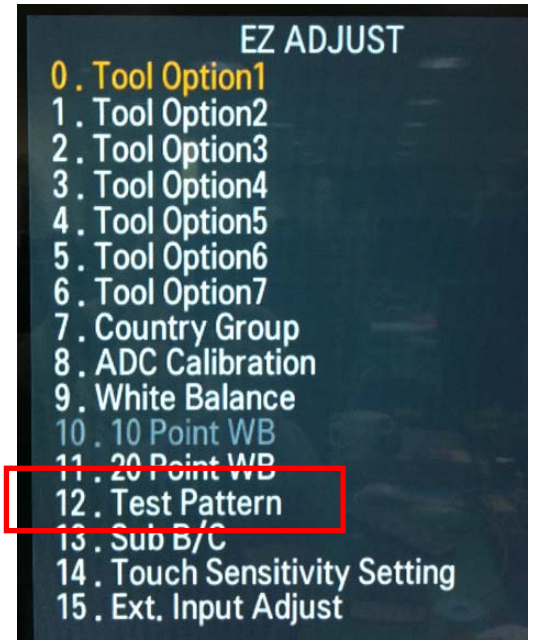
LCD TV	Error symptom	A. Video error_Video error, video lag/stop	Established date	2010. 12 .14	
	Content	TUNER checking part	Revised date		A9

<ALL MODELS>



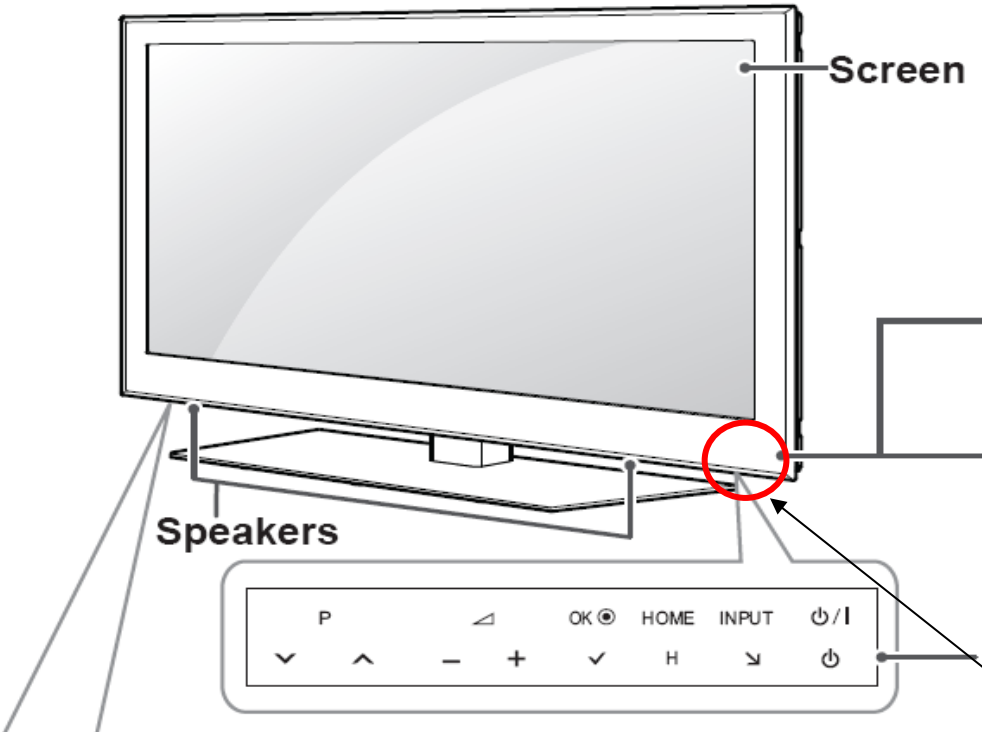
Checking method:
1. Check the signal strength or check whether the screen is normal when the external device is connected.
2. After measuring each voltage from power supply, finally replace the MAIN BOARD.

LCD TV	Error symptom	A. Video error_Color error	Established date	2010. 12 .14	
	Content	Adjustment Test pattern - ADJ Key	Revised date		A12



You can view 6 types of patterns using the ADJ Key
Checking item : 1. Defective pixel 2. Residual image 3. MODULE error (ADD-BAR,SCAN BAR..)
4.Video error (Classification of MODULE or Main-B/D!)

LCD TV	Error symptom	B. Power error _No power	Established date	2010. 12 .14	
	Content	Check front display LED	Revised date		A17

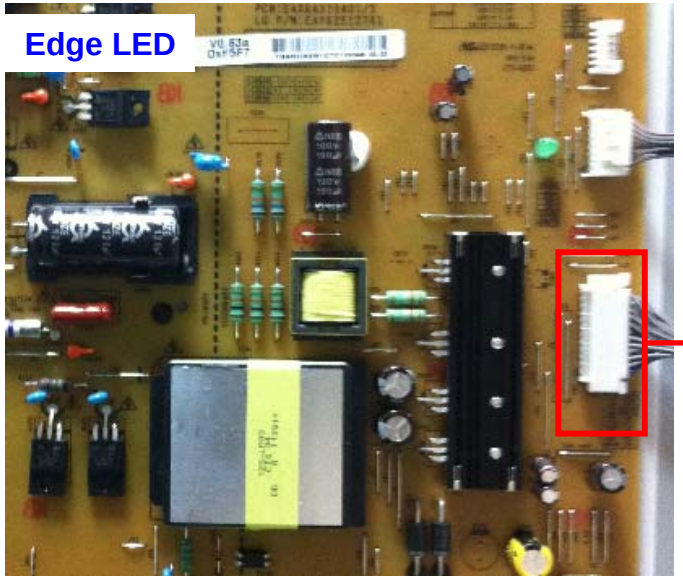


Front LED control :
Menu → Option → Power Indicator → Standby light ON

ST-BY condition: Red
Power ON condition: white

LCD TV	Error symptom	B. Power error _No power	Established date	2010. 12 .14	
	Content	Check power input voltage and ST-BY 5V	Revised date		A18

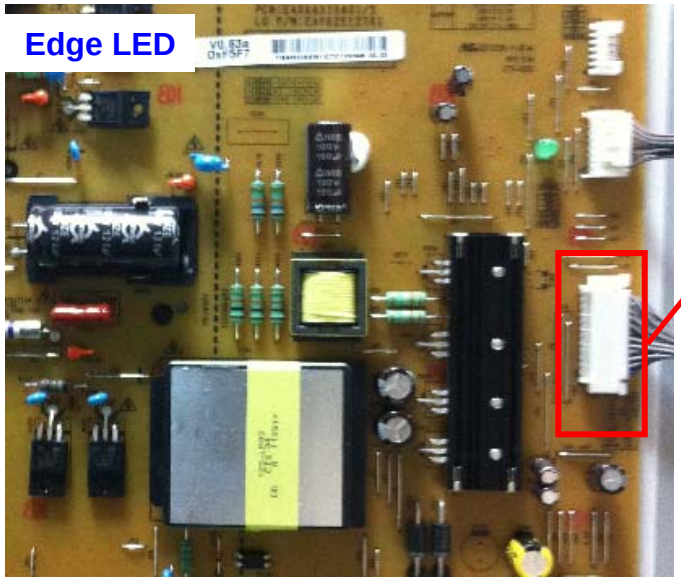
For ’10 models, there is no voltage out for st-by purpose.
When st-by, only 3.5V is normally on.



24 Pin (Power Board ↔ Main Board) – 공통			
SMAW200-H24S (YEONHO)			
1	Power on	2	24V
3	24V	4	24V
5	GND	6	GND
7	GND	8	GND
9	3.5V	10	3.5V
11	3.5V	12	3.5V
13	GND	14	GND
15	GND	16	GND
17	12V	18	Inverter On/off
19	12V	20	Lamp : A-Dim LED : N.C
21	12V	22	PWM Dim #1
23	GND/P_DIM2 • Lamp SCANNING Model : PWM Dim #2	24	Error-out

LCD TV	Error symptom	B. Power error _No power	Established date	2010. 12 .14	
	Content	Checking method when power is ON	Revised date		A19

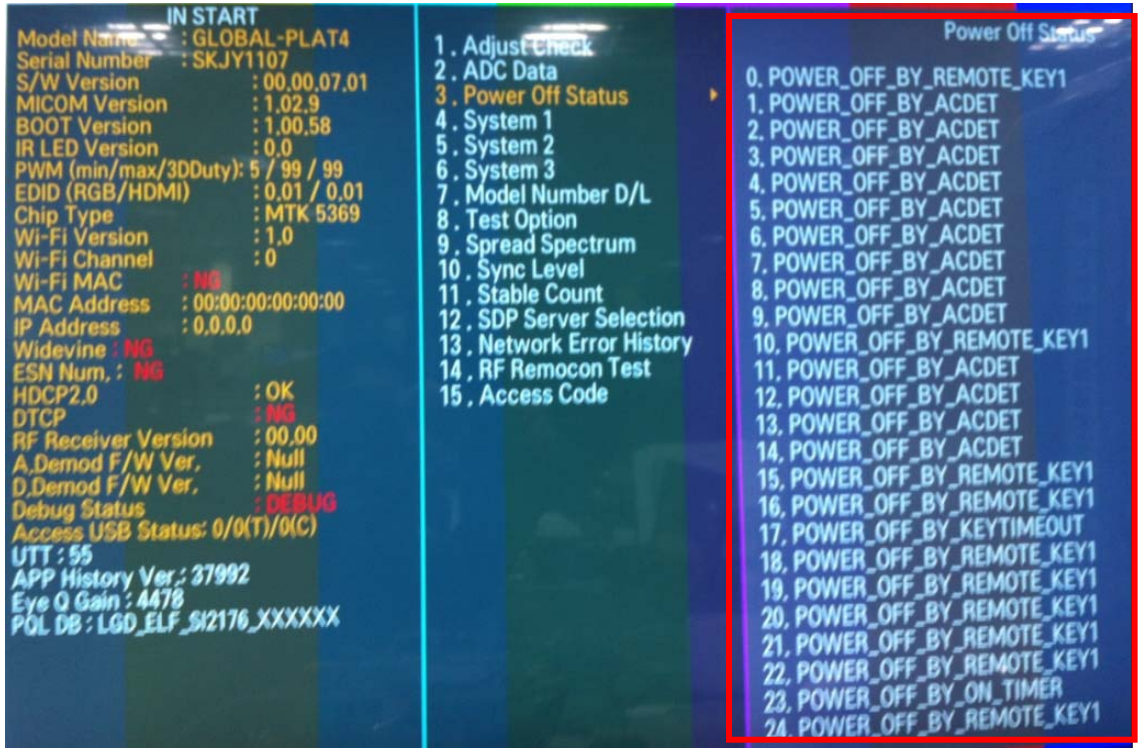
Check “power on” pin is high



24 Pin (Power Board ↔ Main Board) – 공통			
SMAW200-H24S (YEONHO)			
1	Power on	2	24V
3	24V	4	24V
5	GND	6	GND
7	GND	8	GND
9	3.5V	10	3.5V
11	3.5V	12	3.5V
13	GND	14	GND
15	GND	16	GND
17	12V	18	Inverter On/off
19	12V	20	Lamp : A-Dim LED : N.C
21	12V	22	PWM Dim #1
23	GND/P_DIM2 • Lamp SCANNING Model : PWM Dim #2	24	Error-out

LCD TV	Error symptom	B. Power error _Off when on, off whiling viewing	Established date	2010. 12 .14	
	Content	POWER OFF MODE checking method	Revised date		A22

<ALL MODELS>



Entry method

1. Press the IN-START button of the remote controller for adjustment

2. Check the entry into adjustment item 3

LCD TV	Error symptom	C. Audio error_No audio/Normal video	Established date	2010. 12 .14	
	Content	Checking method in menu when there is no audio	Revised date		A24

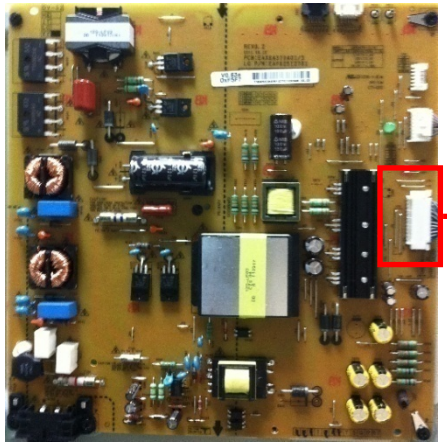
<ALL MODELS>

Checking method

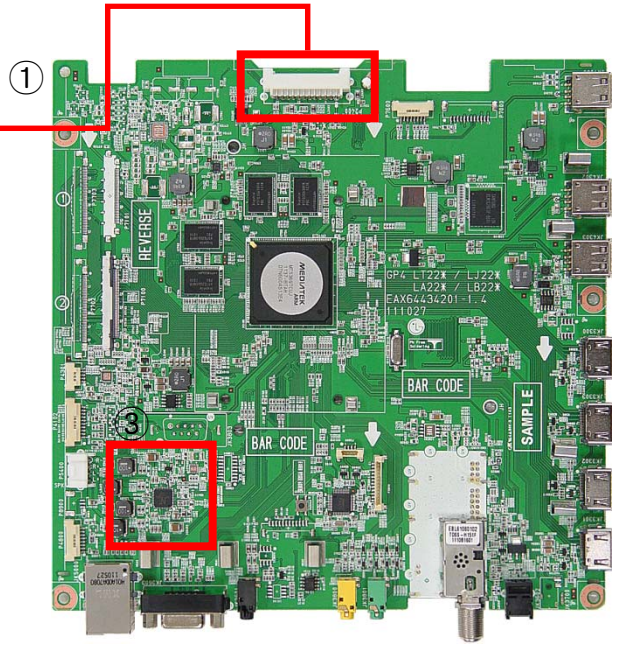
1. Press the MENU button on the remote controller
2. Select the AUDIO function of the Menu
3. Select TV Speaker from Off to On

LCD TV	Error symptom	C. Audio error_No audio/Normal video	Established date	2010. 12 .14	
	Content	Voltage and speaker checking method when there is no audio	Revised date		A25

<ALL MODELS>



24 Pin (Power Board ↔ Main Board) – 공통			
SMAW200-H24S (YEONHO)			
②	Power on	2	20V (24V)
3	20V (24V)	4	20V (24V)
5	GND	6	GND
7	GND	8	GND
9	3.5V	10	3.5V
11	3.5V	12	3.5V
13	GND	14	GND
15	GND	16	GND
17	12V	18	Inverter On/off
19	12V	20	Lamp : A-Dim LED : N.C
21	12V	22	PWM Dim #1
23	GND/P_DIM2	24	Error-out



Checking order when there is no audio

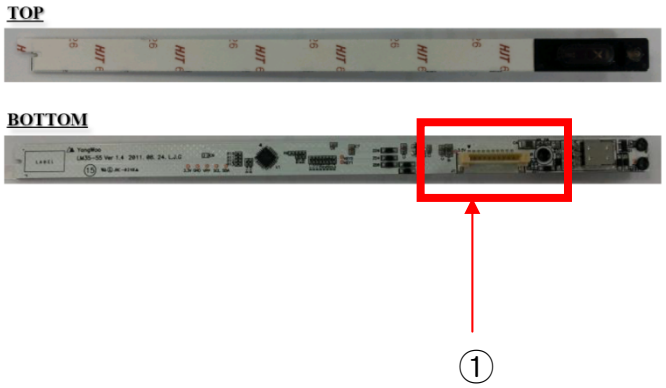
① Check the contact condition of or 24V connector of Main Board

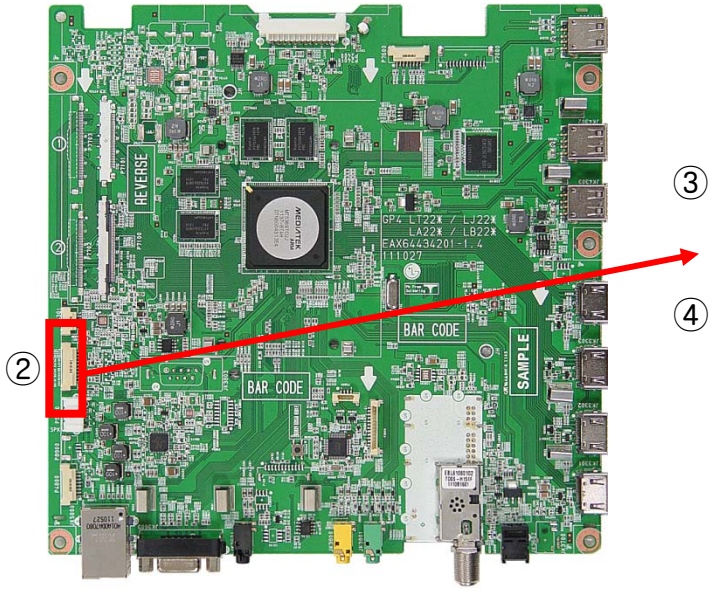
② Measure the 24V input voltage supplied from Power Board
(If there is no input voltage, remove and check the connector)

③ Connect the tester RX1 to the speaker terminal and if you hear the “Chik Chik” sound when you touch the GND and output terminal, the speaker is normal.

LCD TV	Error symptom	D. Function error_ No response in remote controller, key error	Established date	2010. 12 .14	
	Content	Remote controller operation checking method	Revised date		A27

<ALL MODELS>





P4102	
1	SCL
2	SDA
3	GND
4	KEY1
5	KEY2
6	St 3.5V
7	GND
8	RED_LED
9	IR
10	GND

Checking order

1, 2. Check IR cable condition between IR & Main board.
3. Check the st-by 3.3V on the terminal 6.
4. When checking the Pre-Amp when the power is in ON condition, it is normal when the Analog Tester needle moves slowly, and defective when it does not move at all.

LCD TV	Error symptom	D. VCOM Adjustment	Established date	2010. 12 .14	
	Content	Sequence of the Vcom adjustment	Revised date		A28

1. Case

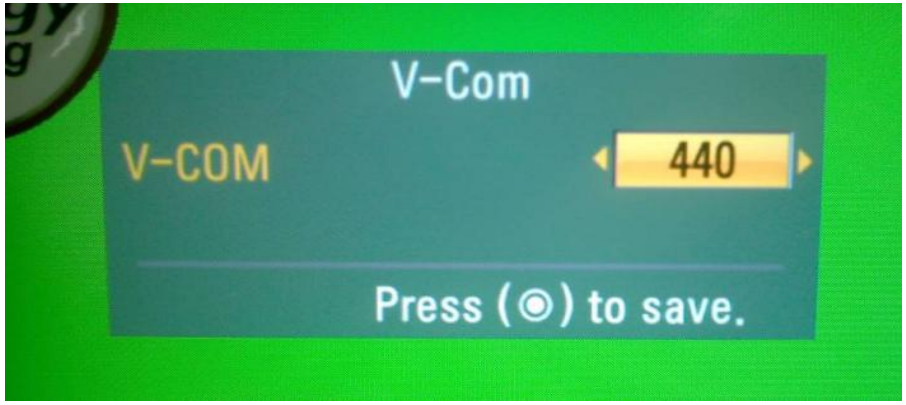
■ LCD module change
■ T-Con board change

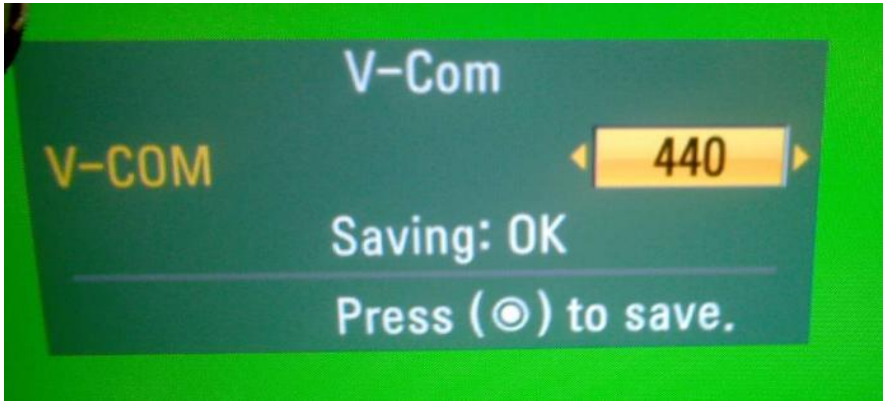
2. Equipment

■ Service Remote controller

3. Adjust sequence

■ Press the ‘adj’ key
■ select V-COM
■ As pushing the right or the left button on the remote controller, And find the V-COM value Which is no or minimized the Flicker.
(If there is no flicker at default value, Press the exit key and finish the VCOM adjustment.)
■ Push the OK key to store the value. Then the message “Saving OK” is pop.
■ Press the exit key to finish V-COM adjustment.

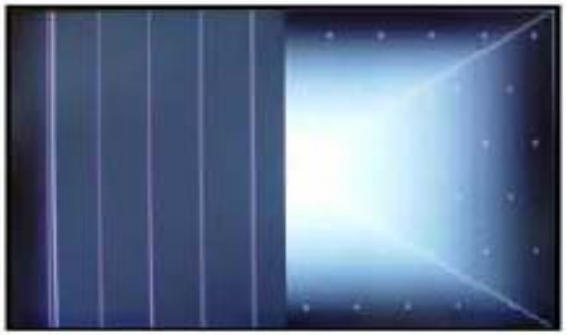




Appendix : Exchange T-Con Board (1)

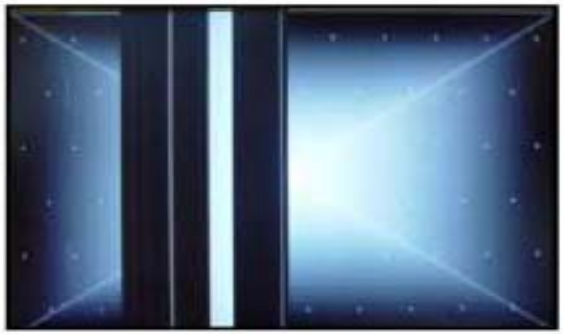
Solder defect, CNT Broken

Solder defect, CNT Broken



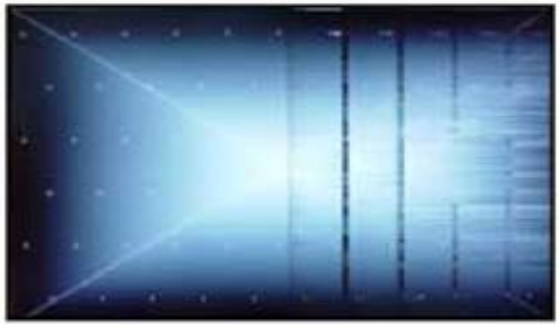
Solder defect, CNT Broken

Solder defect, CNT Broken



Solder defect, CNT Broken

Abnormal Power Section



Solder defect, Short/Crack

Abnormal Power Section

Solder defect, Short/Crack

Appendix : Exchange T-Con Board (2)

Abnormal Power Section

Abnormal Power Section

Solder defect, Short/Crack

Solder defect, Short/Crack

Fuse Open, Abnormal power section

Abnormal Display

GRADATION

Noise

GRADATION

Appendix : Exchange PSU(LED driver)

No Light

Dim Light

Dim Light

Dim Light

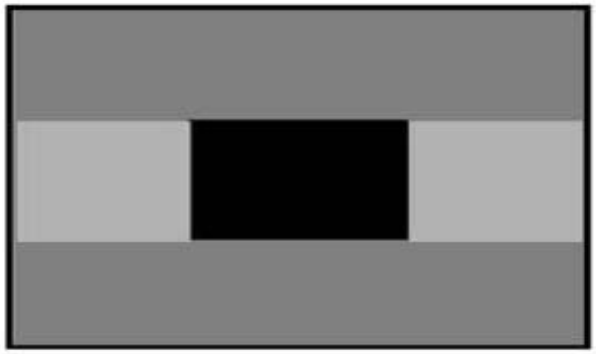
No picture/Sound Ok

Appendix : Exchange the Module (1)

Panel Mura, Light leakage

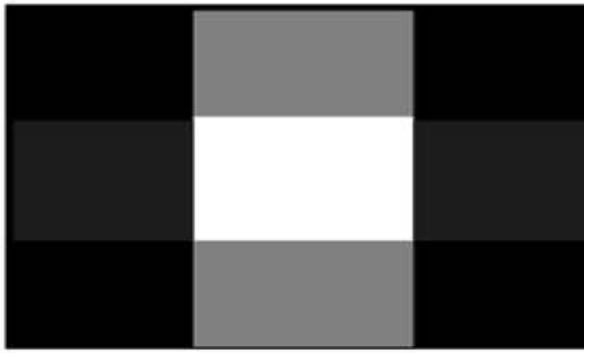
Panel Mura, Light leakage

Press damage



Crosstalk

Press damage



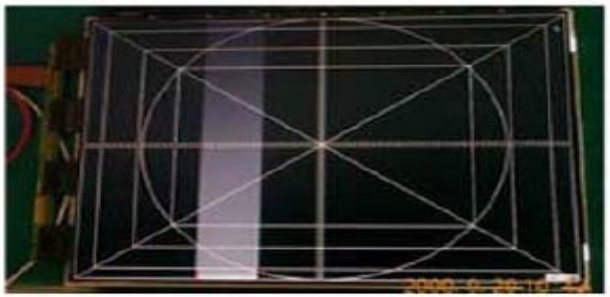
Crosstalk

Press damage

Un-repairable Cases

In this case please exchange the module.

Appendix : Exchange the Module (2)



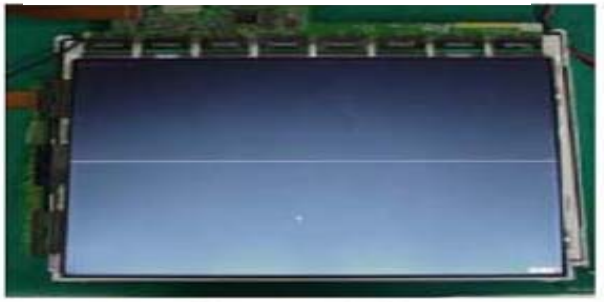
Vertical Block
Source TAB IC Defect

Vertical Line
Source TAB IC Defect

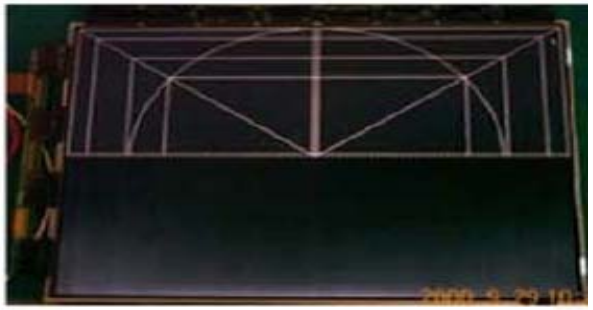
Vertical Block
Source TAB IC Defect

Horizontal Block
Gate TAB IC Defect

Horizontal Block
Gate TAB IC Defect



Horizontal line
Gate TAB IC Defect



Horizontal Block
Gate TAB IC Defect

Un-repairable Cases

In this case please exchange the module.